AIR CONDITIONING HEATING AND VENTILATING

FEBRUARY, 1958—55th Year

Curtain Wall Construction for Utility's New Office Building
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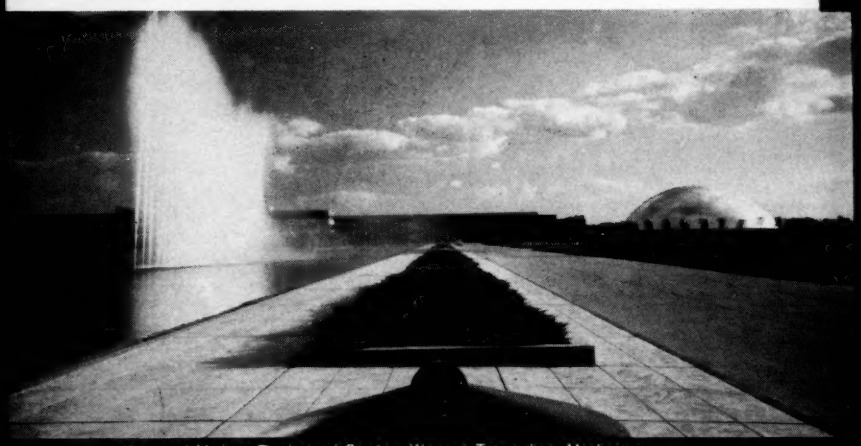
COUNT ON WATTS FOR PROTECTION WHERE IT COUNTS



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WATTS

Why a Steam Trap Has to Handle "Air"

Low temperatures and corrosion of equipment are often evidence of inadequate trap air venting capacity

Air, with its load of oxygen and carbon dioxide, has an unwholesome habit of interfering with the efficiency of steam heated units. If steam were always free of these undesirable companions, things would be a lot simpler for men-who-operate-plants. Because it isn't, three unhappy situations frequently occur:

1. ***Operating temperatures are subnormal.*** This is a two-part problem. First, an air-steam mixture has a lower temperature than pure steam at the same pressure—see Table A. Secondly, air can "plate out" on heat transfer surfaces as shown in Figure 1. Under some conditions, such an air film will knock down heat transfer efficiency by as much as 50%.

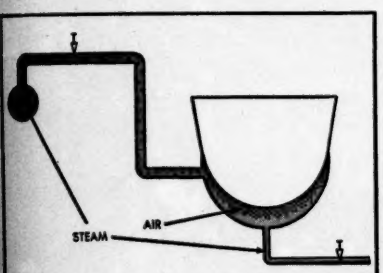


Fig. 1. *How air can "plate out" on heat transfer surfaces. This "insulation" drastically reduces heat transfer efficiency. Armstrong trap operation creates turbulence in the equipment that prevents this.*

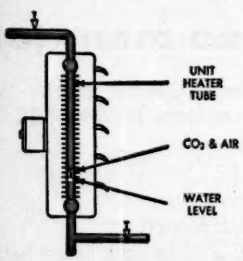


Fig. 2. *Corrosion occurs when units are not kept continuously free of both condensate and air. Armstrong traps discharge both,* at steam temperature, *as fast as they accumulate.*

2. ***Corrosion rears its ugly head.*** Oxygen and carbon dioxide are real trouble-makers. CO_2 gas goes into solution in condensate, forms carbonic acid and chews away at vulnerable metal sections. O_2 aggravates the situation. See Figure 2.

TABLE A—How air reduces steam temperature.

Gauge Pressure	Temp. of Steam with No Air Present	Temp. of Steam Mixed With Various Amounts of Air (% Air by Volume)	
		10%	30%
10.3	240.1	234.3	220.9
25.3	267.3	261.0	246.4
50.3	298.0	291.0	275.1
75.3	320.3	312.9	295.9
100.3	338.1	330.3	312.4

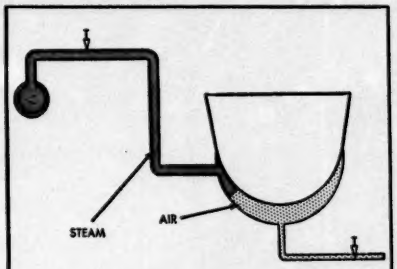


Fig. 3. *When steam is turned on, it takes a trap with extra air venting capacity to provide fast heat-up.*

3. ***Heat-up is slow as a snail.*** Air has a picnic in units that are shut off periodically. Figure 3 pictures the problem. Lines and equipment literally fill up with air. When the steam is turned on it can get in only as fast as the air gets out.

Enter Steam Traps

Curing these steam system ailments involves an operation sometimes called a "trap transplant." It consists of removing traps that don't get the air out and replacing them with traps that do.

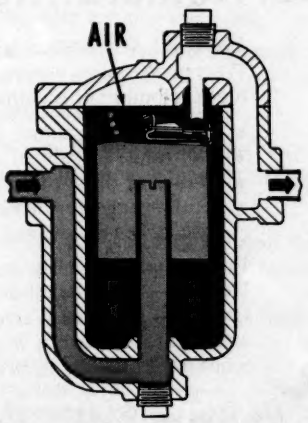
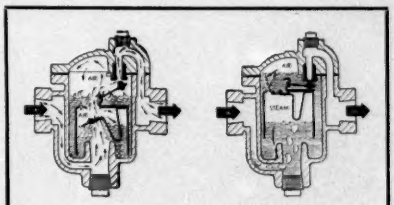


Fig. 4. *Air entering an Armstrong trap passes through the bucket vent and accumulates in the top of trap. When trap opens, air is discharged along with condensate.*

Figure 4 shows how an Armstrong inverted bucket trap continuously vents air. What the picture doesn't show is a built-in plus-value of this trap's design. An Armstrong trap opens suddenly, creating a momentary pressure drop and turbulence in the unit being drained. This breaks up air films and "pumps" air down to the trap so it can be vented.

The vents in standard Armstrong trap buckets will pass all the air normally encountered. In special cases, such as paper machine dryers, the vents are correctly sized larger at the factory to meet the requirement.



Thermostatic vent open. *Thermostatic vent closed.*

Fig. 5. *Open float with thermostatic vent for off-and-on units. When trap is cold, vent is open, permitting air to blow through when steam is turned on. When steam reaches trap, heat closes thermostatic vent. Then, regular bucket vent handles all air coming in with steam.*

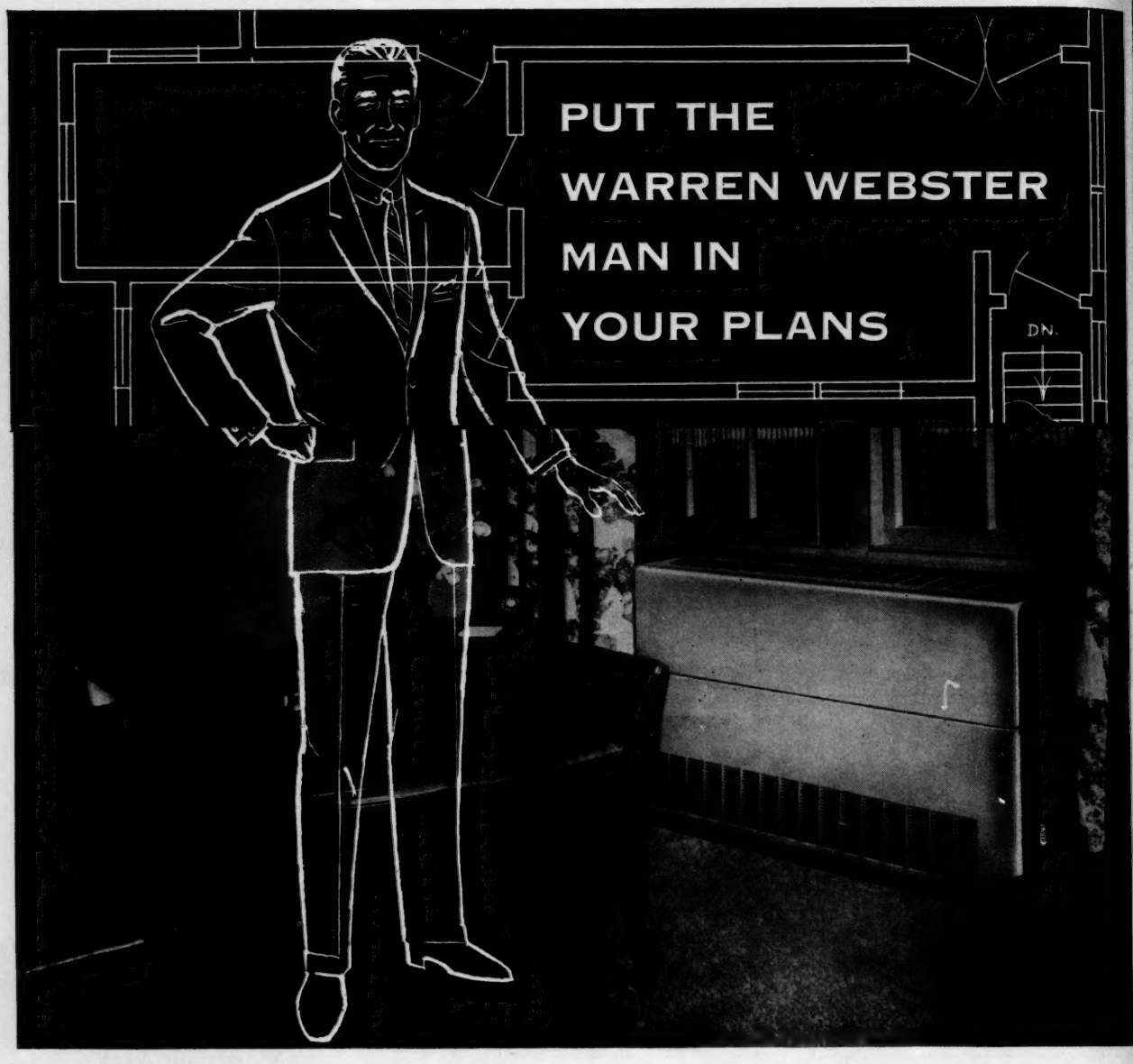
Open Float with Thermostatic Vent

Super air-venting capacity is a must for fast heat-up of low pressure unit heaters, heating coils, steam headers and other units that are on-and-off. Figure 5 shows how the Armstrong open-float-with-thermostatic-vent trap takes care of this.

* * *

The 44-page Armstrong steam trap book covers other features of the Armstrong trap as well as its excellent air handling characteristics. This catalog also discusses trap selection, installation and maintenance. Your local Armstrong Representative or Distributor will be glad to give you a copy. Call him, or write Armstrong Machine Works, 8462 Maple Street, Three Rivers, Michigan.

ARMSTRONG STEAM TRAPS



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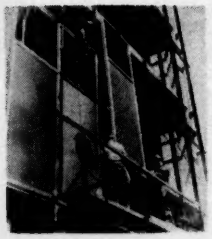
AIR CONDITIONING HEATING AND VENTILATING

Volume 55, Number 2 **February, 1958**

THE COVER



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HIGH SPOTS

• Built-in cooling systems for underground electric power cables are being tested by Ontario Hydro in Toronto. Water piped through small diameter polyethylene pipe laid alongside of 115-kv cable is expected to make it possible to boost the power carrying ability of the cables. This would defer laying in additional cable. The cooling system adds about 5% to the cost of the cable installation.

• Highlights of the 1957 survey of engineering enrollment conducted annually by U.S. Office of Education and American Society for Engineering Education include the following: Total engineering enrollment reached the highest level in our history —297,000—an increase of 7.2% over last year, compared with an increase of 4.1% for all college enrollment. The number of engineering bachelors degrees awarded in the U. S. increased in 1956-57 by 18.6% over the year before. The number of masters degrees rose 10.8%; number of doctorates declined 2.3%.

• A greatly expanded approach to problems of industrial and building sanitation is foreseen in the 3rd National Industrial and Building Sanitation Maintenance Show, according to the Institute of Sanitation Management, sponsors of the show which will take place at Convention Hall in Philadelphia, November 3-6, 1958. It is designed particularly for the executive who specifies the purchase and/or buys industrial and building sanitation products and equipment.

• The Nineteenth Annual Meeting of the American Industrial Hygiene Association will be held in Atlantic City, N. J., April 21-26, 1958. Over one hundred technical papers will be presented on topics from the fields of radiation, air pollution, noise, toxicology, engineering control of hazards, and analytical chemistry. Professional hygienists and interested persons from industry, public health, labor and management groups, schools and universities, safety and technical organizations, medical institutions, and from the armed forces will convene to discuss current problems and recent advances in these fields. Meetings of the American Conference of Governmental Industrial Hygienists, the Industrial Medical Association, the American Association of Industrial Dentists and the American Association of Industrial Nurses will be held concomitantly, thereby constituting the 1958 National Industrial Health Conference.

• Details of the American Society of Heating and Air-Conditioning Engineers research program on Heat Transfer through Windows Shaded by Roller Shades were discussed recently at the Society Research Laboratory, Cleveland, Ohio, during a meeting attended by some members of the ASHAE Technical Advisory Committee on Heat Transfer through Fenestration, representatives of the shade-cloth manufacturers, and ASHAE Research Laboratory staff personnel. This meeting provided an opportunity to ask the representatives of the shade-cloth manufacturers for recommendations regarding the types of shades which should be evaluated and the way in which the shades should be mounted. It was agreed that roller shades of opaque, translucent and metallic types would cover adequately the variables which are important in the study of heat transmission. Discussion of the effect the color of a shade has on heat gain when solar radiation falls upon it, particularly when studying heat gain during summer months only, resulted in the selection of white and dark green shades for this study. These colors, it was pointed out, are the most popular and also are representative of the extreme conditions of color.

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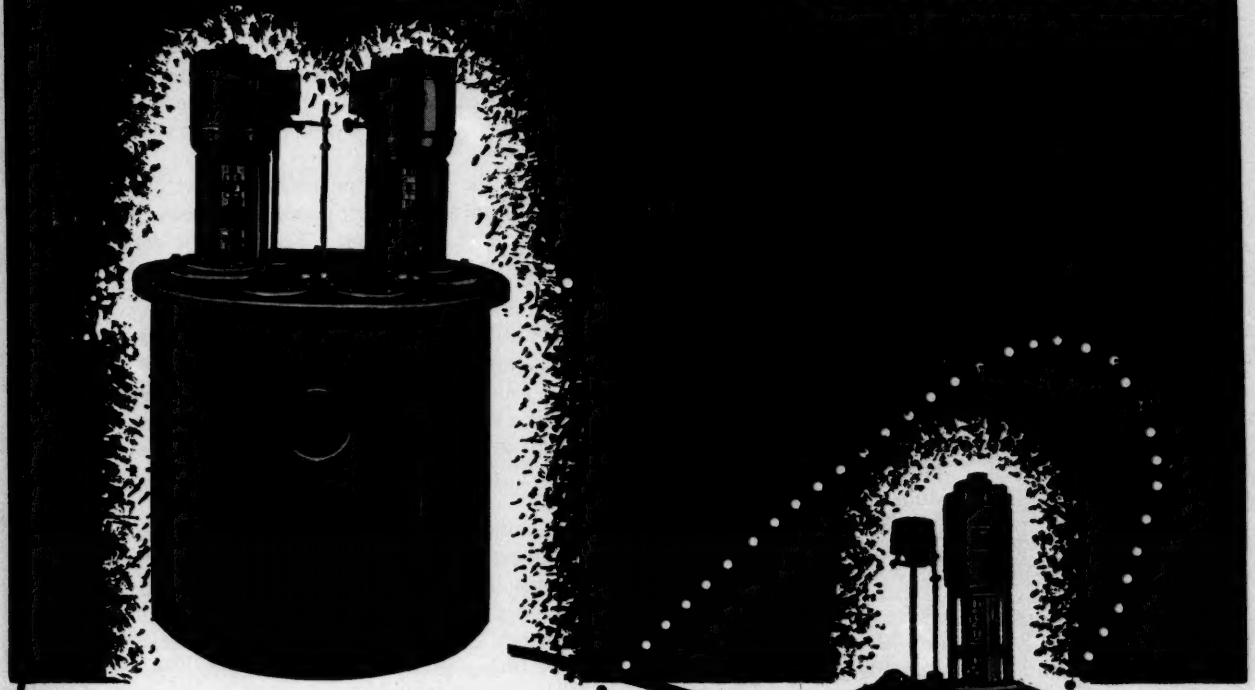

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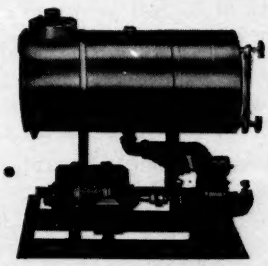

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WASHINGTON OVERTONES

by LORING F. OVERMAN

● In 1957 BS (Before Sputnik), it had been assumed that the 85th Congress, Second Session, would approve limited tax concessions to encourage voters, and that a number of middle-of-the road concessions would be made in the name of good politics. Instead, things stack up this way:

Budget, $73.9-billion! All hope for tax cuts went into orbit when President Eisenhower proposed a $73.9-billion budget for fiscal 1959. The increase is primarily for the Defense Department. Congress expects little opposition to any increases it may make in that field, for political ears detect that the American public is not unwilling to pay handsomely to put this country into the No. 1 spot, spacewise.

Debt limit, up $5-billion? To attack the military problem without (during an election year) increasing taxes, the Administration proposes to increase the permissible national debt to $280-billion, from $275-billion. The increase would permit borrowing to pay for the additional costs of missile-defense—deferring repayment to days less vote-sensitive.

● Principal concern of those hoping to hold a brake on spending is that the defense emergency will be made an excuse for uninhibited raiding of the Treasury.

Tax-conscious organizations are insisting that increases in defense spending be accompanied by economies in general expenses of government. How unpopular this viewpoint can be became apparent during recent three-day hearing before the Housing Subcommittee of the House Banking Committee, on urban renewal and slum clearance.

Commenting on the possibility that some government expenditures might have to be deferred, Committee Chairman Albert Rains (D-Ala.) observed: "The President's speech was just missiles and missiles. I think we can have missiles—and butter too."

The committee then heard New York's Mayor Robert F. Wagner recommend:

—Immediate release of the $450-million in redevelopment commitments previously authorized by Congress.

—Additional capital grant authority of at least $350-million for 10 years.

—Federal financial participation at the rate of 80% of net costs, instead of present 66-2/3%.

—Broadening of supply of mortgage credit, to encourage upturn in private residential construction.

● The look-ahead in private housing is for 1.1-million starts in 1958. This increase, although small, would reverse the trend of the past two years. Easier mortgage money and relaxation of purchase terms for FHA housing are expected to encourage the upturn.

Year-end report of Bureau of Labor Statistics showed a 1957 total of 1,039,000 housing and apartment unit starts down 7% from 1956. Private housing starts totaled 989,700 for the year—the decline reflecting reduced number of single-family dwellings in metropolitan areas. There was a 40% increase in private apartment building.

Public housing starts, at 49,500, were more than double the 1956 total. Single family units at military installations were responsible for the increase.

●Although 1958 may have its rough spots, a possible record-breaking market is in prospect for those who serve the institutional and mass-housing-feeding categories.

Projections from a joint release of Departments of Commerce and Labor indicate an all-time high of $12,277,000,000 in construction for 1958—6% higher than the record 1957 total of $11,582,000,000. The outlook:

—Hospitals; up 10% from this year's $835-million to $930-million in 1958.

—Schools; up $185-million (5%) from 1957 figure of $3.355-billion to $3.540-billion.

(Continued on page 8)

Make this Test

for Heat Flow in Buildings!

Try this experiment. Take a piece of multiple layered aluminum. *(We'll send you some free samples.)* Hold it very close to your cheek without touching. You'll be surprised! Notice how, in seconds, your cheek feels a glow of warmth. Why? Because the heat rays which are leaving your face (although without temperature), are being thrown back again at a 97% rate by this amazing insulation. Reflected to your cheek, the rays are now re-absorbed at a 90% rate and turned into heat.

THE BIG THIEF

The same thing happens in building spaces. This simple experiment illustrates an extremely important principle of heat flow. The greatest thief of fuel, of heat, and of comfort in buildings in winter, and of comfort and electricity for air-cooling in summer, is the flow of heat by Radiation.

Put multiple sheets of scientific prefabricated aluminum insulation inside wall and roof spaces to bar the path of this thief. For multiple aluminum throws back, with 97% reflectivity, the heat rays that strike its surfaces. It also retards, most effectively, the flow of heat by Convection, Conduction, and Vapor Flow.

The tough aluminum sheets in multiple aluminum are almost completely impervious to water vapor, and are long and continuous. Infiltration under flat, stapled flanges is slight.

Where multiple aluminum is used, fortuitous vapor and water (for instance rain) which intrude into wall and similar spaces, will gradually flow out as vapor through exterior walls and roofs as pressure develops within, because vapor flows from areas of greater to less density. The vapor cannot back up through the continuous, almost completely impervious aluminum, so it flows *out* because exterior walls and roofs have substantial permeability compared to aluminum, far greater than the required 5 to 1 ratio.

For maximum uniform depth protection against heat loss and condensation formation, use **edge-to-edge** multiple aluminum, **each** sheet of which stretches from joist to joist.

Some very interesting heat flow tests in roofs and walls with aluminum insulations, at Massachusetts Institute of Technology and Pennsylvania State College Engineering Experiment Station, including exposure of aluminum foil over a period of 10 years to fumes, dust, salt sea air and even spray, are described in a booklet, "Thermal Test Coefficients of Aluminum Insulation for Buildings." Use coupon for free copy.

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WASHINGTON OVERTONES *(Continued from page 6)*

—Hotels, Motels; further gain of 5% during 1958.

—Restaurants; up 5% over 1957.

—Public Residential (federal, state and local government-financed dormitories and other housing for nurses, physicians and armed service units) will show the largest gain. Total at $637.5-million, will be almost double the 1957 figure. Again, this category reflects expansion and opening of new bases for nuclear projects, missile testing, and similar defense activities.

In addition to new construction in most of the foregoing commercial fields, the modernizing and remodeling opportunities will be highly important. With increased competition from new construction, older units in institutional facilities serving the public will be forced to modernize.

● Scope of the Small Business Administration's loan program is revealed in a cumulative report released in mid-January. Since September of 1953, when the SBA financial assistance program was started, the agency has approved 8,579 business loans for $398,148,000 and 6,916 disaster loans for $71,709,000; a total of 15,513 loans for $459,857,000.

Loans totaling $264,000 were granted during December to eight heating and ventilating firms employing 75 persons.

Small business loan approvals increased one-third in amount and one-fifth in number in 1957, as compared with 1956. During 1957 the agency approved 3,437 business loans totaling $162,399,000, as compared with 2,890 in 1956 for a total of $121,704,000.

Small business would enjoy special tax concessions if Congress passes legislation sponsored by seven (Democratic) members of the House Small Business Committee. The bill includes four changes recommended by the President's Cabinet Committee on Small Business (August 7, 1956), and adds a fifth which would permit tax-free plowing back of certain earnings. Other points involve a rate reduction, accelerated depreciation for second-hand equipment, optional partnership treatment for corporations with few stockholders, and optional installment payment of taxes on estates consisting of investments in closely held businesses.

● New markets for the products and services of those who produce and install air conditioning, heating, and ventilating equipment are bubbling to the surface in the soon-to-boil nuclear energy program. Typical of the latent opportunities are two recent developments in Washington.

In the first, AEC Chairman Lewis L. Straus announced completion of plans to indemnify major contractors up to $500-million per incident in the event of nuclear accident. This will clear the way for participation by industry in many atomic programs now held up awaiting solution of the problem of liability in the event of serious accident.

In a second development, Senate Bill 3000, introduced by Senator Albert Gore (D-Tenn.) would authorize a $1-billion program to spur construction of atomic reactor demonstration facilities, development of thermonuclear energy, and development of space vehicles powered by nuclear energy. The new Gore bill adds a proposed $600-million to the $400-million programs he introduced in 1956 and 1957.

● Washington's plans are being made on the assumption that business will recover sharply during the year. Reasons cited:

—Local, state and federal government spending will be up.

—Road building program will be in full swing.

—Housing starts should exceed one million.

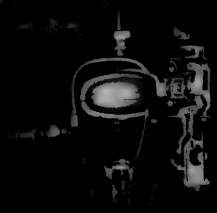
—Federal Reserve System loosening reins on some business credit.

—Farm income may show slight improvement.

—Some tax reform may encourage business initiative.

—There is a chance of limited corrective labor legislation which, in the long run, would encourage increased productivity and be helpful to both employer and employee.

—Finally, the election year necessity to travel midstream may even the business keel and result in smoother sailing.



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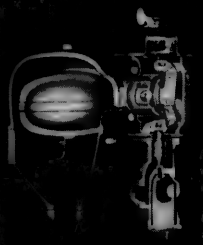

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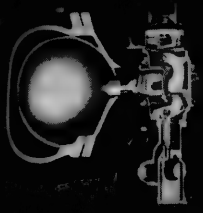

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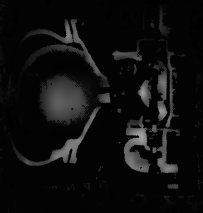


53-2 Feeder Cut-off Com-
nation. For higher pressure
ilers, up to 75 lbs. Used on
th steam and hot water space
ating boilers.

The horsepower in your boiler can get thirsty too!

Right from the start, let's get this straight: We're talking about hot water space heating boilers as well as steam heating boilers.

Both kinds can get thirsty. Both can run into a hazardous low water condition from any of a dozen and more reasons.

There's only *one* real answer to the question of a thirsty boiler. That is to install the device that automatically adds water to maintain a safe level in the boiler, then stands by to stop the firing if boiler water drops to a dangerous level.

McDonnell feeder cut-off combinations have been doing just that for many years. They are the best-known, most widely used controls of their kind. Make them a part of every boiler installation.

To have the facts handy, write for complete Catalog.

McDONNELL & MILLER, *Inc.*, 3500 N. Spaulding Ave.
Chicago 18, Ill.

Doing One M&M SAFETY CONTROLS *Thing Well*

McDONNELL

BRIEFLY STATED

WITH THE SOCIETIES AND INSTITUTES—A "Seal of Quality" program, whereby suppliers of first quality steel pipe nipples may be identified, has been inaugurated by the NATIONAL ASSOCIATION OF PIPE NIPPLE MANUFACTURERS, INC., New York, N. Y., a move prompted by the fact that some nipples made from material of dubious quality have been reaching the market. A seal affixed to its product certifies that the maker sells steel pipe nipples conforming to Commercial Standard CS5-46 of the National Bureau of Standards and made from new, full-weight, mill-tested pipe in accordance with ASTM specifications . . .

At the fall meeting of the FUEL OIL AND WATER HEATER MANUFACTURERS ASSOCIATION, held in Buffalo, N. Y., the proposed standards for thermal design of high temperature water heat exchangers were completed and referred to a subcommittee. At their next meeting these standards will be approved and adopted . . . During 1957 membership in BUILDING RESEARCH INSTITUTE, Washington, D. C., grew from 393 to 492, an increase of 23% . . .

At the annual National Spring Meeting of the AMERICAN WELDING SOCIETY, New York, N. Y., 95 authors will present 63 papers. Five days of technical sessions will take place at the Hotel Statler, St. Louis, Mo., April 14 through 18, inclusive. A three-day show will be held April 15 to 17 . . .

Owen F. Shobe has been retained as paint engineering service consultant by LEAD INDUSTRIES ASSOCIATION, New York, N. Y. He will be available to users of red lead and other lead pigmented paints for consultation and advice on formulation, specification, and application to get optimum service from lead paints . . . Cyril Ainsworth, technical director of AMERICAN STANDARDS ASSOCIATION, New York, N. Y., is appointed deputy managing director of the association. J. W. McNair, assistant technical director, and for many years in charge of the electrical and photographic work of the association, succeeds Mr. Ainsworth . . . Wendell R. Spackman, architect and partner in the firm of Corlett & Spackman, has been elected chairman of the BUILDING INDUSTRY CONFERENCE BOARD, San Francisco, Calif. He succeeds K. E. Parker, contractor. The new vice-chairman is Dudley Deane, consulting engineer, and William E. Hague of Associated General Contractors will continue as honorary secretary.

• Holmes & Narver, Inc., Los Angeles engineering and construction firm, observes its 25th anniversary this year. Some 700 of the firm's home office employees have presented a silver testimonial plaque to the company's founders, James T. Holmes and D. Lee Narver. Mr. Holmes serves as president, and Mr. Narver as chairman of the board.

• Air Conditioning Co., Inc. (Southern California), commercial air conditioning contractor, elected Richard McKibben and Kenneth Simon to the board of directors. Both are project engineers.

• Pioneer Service and Engineering Co., Chicago, Ill., announces several personnel changes for this year: Active management of the Rate Division is assumed by Donald H. Callen. Winsor Martin, former manager, becomes rate consultant. Stephen Wehner, consulting hydraulic engineer, retires. His successor is Wilbur Barrows. E. V. Cullen, vice-president and chief purchasing engineer, assumes promotional and special assignments. He is succeeded by J. J. Cuniffe. D. C. Hormell, vice-president and chief engineer, becomes vice-president and consulting engineer and is succeeded by Carl R. Barthelemy. The latter's position of chief mechanical engineer goes to L. J. Booth.

NAME CHANGE—The name Weksler Thermometer Corporation is changed to WEKSLER INSTRUMENTS CORPORATION, because in recent years the products of the Freeport, Long Island, N. Y., firm have become so diversified. For example, 31% of its instrument line is for use in pressure applications, and over 12% in the area of humidity.

• Raymond Mancha, ventilation vice president with Joy Mfg. Co., Pittsburgh, Pa., for the past twelve years, has retired from active business to provide time for pursuit of personal interests and study, including work on advanced concepts of mine and industrial ventilation principles. He is a recognized authority on mine ventilation, and has been a prolific contributor to the literature of the field.

• Robert J. Thompson, one of the nation's pioneer refrigeration engineers, has retired after more than 25 years with the Du Pont Company, the last nine years of which he has been director of sales for its Freon Products Division. Mr. Thompson's career in refrigeration has spanned nearly 40 years, beginning with the General Motors Corporation's program for development of household and commercial electric refrigerators in the early 1920's.

BURGEONING BUSINESS—AIR FILTER CORPORATION is reported very happy with its brand new stone and Roman brick plant and offices on West Woolworth Avenue in Milwaukee. The firm has doubled its capacity with the new structure. Special truck loading platforms expedite traffic. The air conditioned offices are mural decorated. Rodger Clark, president, Ray Breckheimer, vice-president, and Emmet Philipp, secretary, started the firm in 1945. At present, over 60 representatives distribute its line of permanent viscous type air filters, grease filters, and special filters for welding machines . . .

Faster delivery for wholesalers from the southern boundary of New York to the southern boundary of Virginia will result from opening of a sales office and 12,000 sq ft distribution depot of READING TUBE CORPORATION in Philadelphia . . . WARD LAFRANCE TRUCK CORP., Elmira, N. Y., a subsidiary of Glen Alden Corporation, has entered the heating and ventilating field through an agreement to undertake sales, promotion, and manufacture of Gannon heating and ventilating units . . . PITTSBURGH PLATE GLASS CO. will build one of the world's largest continuous fiber glass yarn plants at Shelby, N. C. It will employ approximately 850 persons at capacity operation, will be completely air conditioned . . .

(Concluded on page 12)

you can

HEAT & COOL SIMULTANEOUSLY

with these

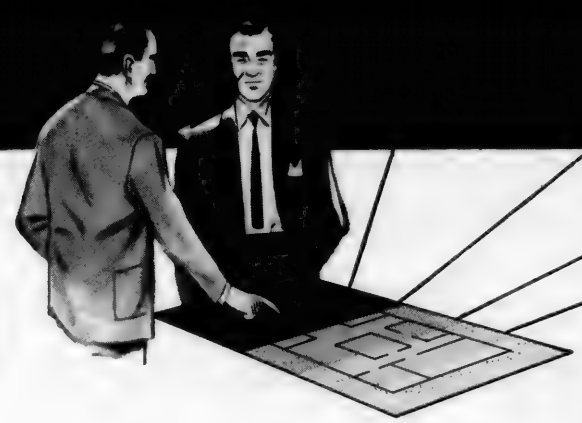
Outside weather conditions, or inside requirements may make it necessary to heat some sections of a building at the same time that other sections require cooling. Where these conditions exist, the McQuay "MC" MULTI-ZONE air conditioning unit will furnish balanced comfort *simultaneously* to different determined areas with either filtered, *cooled* and dehumidified air, or filtered, *heated* and humidified air . . . or a mixture of these in any desired proportions . . . at your command.

If *you* have this problem, contact the nearest McQuay representative for consultation, complete engineering data and costs . . . When it's McQuay, you can be sure that engineering research and know-how have produced the finest, most efficient and dependable equipment available . . . and, only McQuay makes the famous Ripple-Fin coils. McQuay, Inc., 1619 Broadway St. N.E., Minneapolis 13, Minn. Representatives in all principal cities.

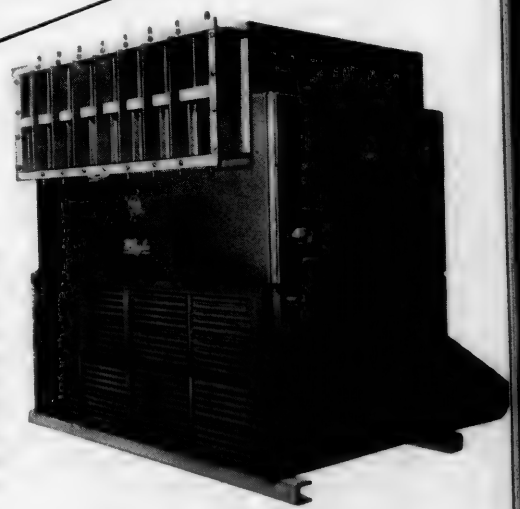
McQuay

I-ZONE

DITIONERS



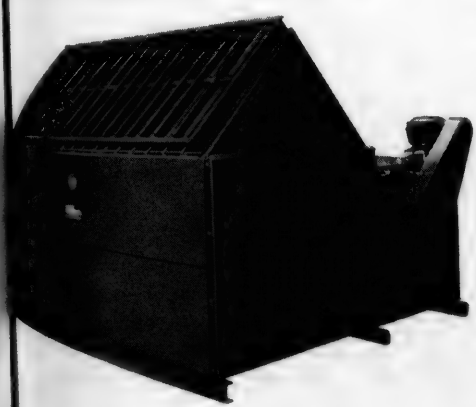
M Means Quality



McQuay VERTICAL Multi-Zone unit

The McQuay "MC" Multi-Zone air conditioning units are available in 8 sizes from 1370 c.f.m. to 21,000 c.f.m. Each unit has a standard number of zones available from 6 on the smallest to 22 on the largest. All zones are interconnected by a single external connecting rod. A full line of accessories is available . . . preheat steam coils, filter sections, mixing boxes, humidifiers.

McQuay HORIZONTAL Multi-Zone unit



McQuay INC.

AIR CONDITIONING
HEATING • REFRIGERATION

BRIEFLY STATED

(Concluded from page 10)

BURNHAM CORPORATION, Irvington, N. Y., has acquired all stock of the Berger Furnace Corp., Belle Vernon, Pa. The new acquisition enables Burnham to serve the warm air heating and cooling industry in addition to its established position in the hydronics industry. Berger will operate as a division of Burnham . . . The directors of AMERICAN AIR FILTER CO., INC., Louisville, Ky., and Kennard Corp., St. Louis, Mo., have approved a proposal that AAF acquire all the shares of the latter. Kennard, producer of ventilating, heating, and cooling equipment, will operate as a wholly-owned subsidiary . . .

WHIRLPOOL CORPORATION has purchased from Servel, Inc., for cash, all facilities, including patents, property, and equipment, relating to the Servel gas refrigerator and ice maker . . . COND-AIR, West Coast manufacturer of air conditioning equipment, has moved into its recently completed plant in Lynwood, Calif., the third move to larger facilities in four years . . . JOY MFG. CO., Pittsburgh, Pa., has concluded a franchise agreement with Industrial Filtration Co., Lebanon, Ind., whereby it becomes exclusive distributor for the Delpark filter to the mining industry in Canada, Mexico, and the United States, except on the West Coast.

NEW DISTRIBUTORS—The following were announced as authorized sources for package air conditioning equipment manufactured by THE TRANE CO., La Crosse, Wis.: Dauer Refrigeration Co., Boston, Mass.; The Raymond Diehl Co., Tallahassee, Fla.; and Cooling Enterprises, Inc., Heights Electric and Engineering, Wyant Engineering Service Co., and Conditioning Service Corp., all of New York, N. Y. . . . Dow-Pierce, Inc., a subsidiary of Boston Filter Co., is organized to operate independently as a distributor of air conditioning equipment of CARRIER CORPORATION in Metropolitan Boston. William Henderson is appointed sales manager; John Koslowski, service manager of the new company.

AMONG THE MANUFACTURERS' PERSONNEL —At MINNEAPOLIS-HONEYWELL REGULATOR CO., Minneapolis, Minn.: A realignment of management in the Commercial Sales Division under R. W. Crysler, manager, including appointment of C. M. Sanders to take charge of development of new products; J. F. Cummiskey, assistant sales manager, who assumes responsibility for sales to all commercial, public, and industrial buildings; and V. D. Wissmiller, who is responsible for establishment of sales policy and financial planning . . . At NORMAN PRODUCTS CO., Columbus, Ohio: Election to the board of directors of Allen W. Lundstrum, president of The Ohio Fuel Gas Company . . . At CARRIER CORP., Syracuse, N. Y.: Roy H. Smiles is appointed eastern regional manager for its Unitary Equipment Division; William H. Macdonald is named assistant manager of Machinery Department, a new post, and Frank M. Fives succeeds him as product specialist of industrial air and gas compressors at company headquarters . . .

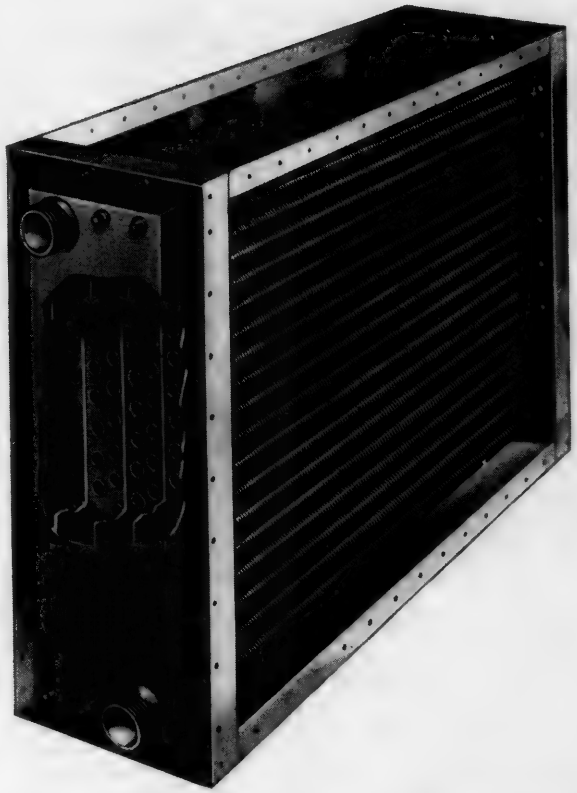
Anthony J. De Fino is elected vice-president of HUPP CORP., Cleveland, Ohio. He had been vice-president and general manager of All-Year Air Conditioning Div., Servel, Inc. . . . Robert Jacobson is the new director of purchases for READING METALS REFINERY CORP., wholly owned subsidiary of Reading Tube . . . Mrs. Alfred C. Buensod is filling the unexpired term of her husband, the late chairman of the board of BUENSOD-STACEY, INC., New York, N. Y.

WESTINGHOUSE ELECTRIC CORP., Pittsburgh, Pa., has placed William A. Meister in charge of its air conditioning division's newly opened New York branch . . . At CHRYSLER CORPORATION'S Airtemp Division, Paul W. Wyckoff has been named vice-president in charge of engineering, while at the company's Airtemp Construction Division, three staff appointments were announced: Joseph S. Topp to manage the Los Angeles headquarters (West Coast Zone); S. Edward Hicks to succeed Mr. Topp as a manager of the division; and Kenneth F. Goldmann, who is to manage field sales from Dayton . . .

At THE BABCOCK & WILCOX CO., Boiler Division, Joseph E. Kossan is appointed Pittsburgh district service engineer, who succeeds Harry G. Klein, retiring after 39 years with the service department; J. Roy Gordon, widely known Canadian and American industrialist and metallurgist, is elected to the board of directors of the company . . . Larry A. Donnenwirth is added to the staff of DUNHAM-BUSH, INC., as sales engineer. Russel E. Comstock is appointed chief engineer at HEAT-X, INC., its subsidiary, where Richard Gardner has joined as application engineer . . . A. S. Chalfant heads up the new sales team at A. M. BYERS CO., Pittsburgh, Pa. Harry R. Rowland, vice-president of wrought iron sales, has retired after 43 years with the company. He will be retained as a consultant.

New sales manager for Jackson & Church Div., YORK-SHIPLEY, INC., York, Pa., is A. W. Pracker, formerly district manager . . . Frank K. Platt, president of Air Engineering Co., Kalamazoo, Mich., is named to the newly created post of central regional manager for all AAF products. Mr. Platt relinquishes his post with Air Engineering to make his headquarters in Detroit . . . R. E. Morris succeeds J. C. Lovelace as manager of ALLIS-CHALMERS MFG. CO.'s St. Louis district. W. P. Bell succeeds him, in turn, in the Washington, D. C., office as manager of Industries Group sales . . . At MCQUAY, INC., Minneapolis, Minn.: Willard B. Buck is named manager of field sales; Alvin R. Flynn is appointed sales manager of heating and air conditioning units; and William P. Peterson is the new advertising manager.

• Leland K. Spink, 58, engineer in charge of flow measurement at The Foxboro Company, died December 23 in Foxboro, Mass. Widely recognized as an authority on flow measurement, Mr. Spink pioneered in calculating and coordinating flow data. Among his inventions are the square root planimeter, and slide rules for sizing control valves and orifices. He was also the author of several flow measurement texts, including the HANDBOOK OF STEAM FLOW MEASUREMENT and PRINCIPLES AND PRACTICE OF FLOW METER ENGINEERING, the eighth edition of which he had just compiled and edited.



AEROFIN TYPE R REMOVABLE-HEADER WATER COILS

• Complete Drainability
• Easily Cleaned
• High Heat Transfer

Completely drainable and easily cleaned, Aerofin Type "R" coils are specially designed for installations where frequent mechanical cleaning of the inside of the tubes is required.

The use of ⅝" O. D. tubes permits the coil to drain completely through the water and drain connections and, in installations where sediment is a problem, the coil can be pitched in either direction. The simple removal of a single gasketed plate at each end of the coil exposes every tube, and makes thorough cleaning possible from either end.

The finned tubes are staggered in the direction of air flow, resulting in maximum heat transfer. Casings are standardized for easy installation.

Write for Bulletin No. R-50.

AEROFIN CORPORATION

101 Greenway Ave., Syracuse 3, N. Y.

Aerofin is sold only by manufacturers of fan system apparatus. List on request.

Scientific Frontiers

Review of 1957 Research

The year 1957 will go into history books as the year when man first launched an artificial satellite into space, suggests Armour Research Foundation of Illinois Institute of Technology in its quarterly publication.

In a less dramatic vein, history could also record 1957 as a year of increased theoretical exploration of matter and the universe, of higher-strength and higher-temperature metals, of drugs for mental illness, of nuclear knowledge becoming public property, of jet transports, electronic miniaturization, more powerful radar, and radical new materials.

But of all the big research programs undertaken during 1957, the biggest was the $250-million International Geophysical Year project. For the first time in history, the whole earth became the laboratory for a coordinated, international scientific study involving more than 5000 scientists and engineers from 56 nations.

While IGY scientists were seeking information on weather, gravity, magnetism, and the atmosphere, others were experimenting with less manifest phenomena. The Conservation of Parity law, a 30-year-old cornerstone of the theory of nuclear forces, toppled under research experiments that showed matter is not equally right and left handed, as in a mirror reflection, but has a definite preference for one or the other.

Accomplishments in basic research were matched by those of applied research with scientists and engineers working toward a better balance between the two. Atomic energy, yesterday's theory, was applied to a greater extent than ever before with approximately 120 reactors in operation or under construction throughout the world, and an estimated $400-million saved for United States industry through the use of radioisotopes.

Industry in the U.S. paid some $7-billion for this research, with the government bringing the 1957 total to $10-billion—a tenfold increase in research expenditures since before World War II.

Health Aspects of Nuclear Radiation

The Harvard School of Public Health will expand its research and teaching in the health hazards of nuclear radiation under a new grant ($500,000 over a 10-year period) from the Rockefeller Foundation. According to Dean John C. Snyder, the School of Public Health is currently concerned with problems of radiation exposures to the public from nuclear power and from other applications of fissionable materials. With the new grant and through support from other financial sources, the School will develop additional facilities for the instruction of physicians, engineers, and other public health specialists in the principles of radiological hygiene and safety. Research will be extended in air cleaning to include the problems of contaminations by radioactive materials; also to studies of animals exposed to radioactivity in air, water, or food.

In addition, to meet the needs of handlers and users of radioactive materials who do not have facilities or trained personnel to adequately monitor their operations, Combustion Engineering, Inc., is offering a complete Health Physics Laboratory and Consulting Service. Fully equipped laboratories and a highly qualified staff at Windsor, Conn., are prepared to handle all phases of radiation protection ranging from surveys of a particular company's requirements to the establishment and management of a complete radiation safety program, including clinical analyses of radioactive substances.

B&G COMPRESSOR AND ELECTRIC COMPRESSOR MOTOR

Designed and built by B&G! Better performing, longer lasting—built of the finest materials to most rigid specifications. *B&G quality in every detail!*

B & G PACKAGE LIQUID COOLER

EQUIPPED WITH B & G PRODUCTS *THROUGHOUT!*

WHY THE B&G PACKAGE LIQUID COOLER CAN BE INSTALLED AT SMALLER COST

1. Equipped with quiet, vibration-free B&G Compressor and Electric Compressor Motor—built for years of lasting service.
2. Equipped with B&G Electric Motors throughout.
3. Factory tested under certified conditions and varying loads.
4. Completely wired with interlocked controls. (A truly "plug in" appliance.)
5. Completely enclosed in good looking, rugged steel frame.
6. New, compact design B&G Evaporator—improved type heat transfer surface. Built to ASME Code, and so inspected and stamped.
7. B&G Condenser has more generous fouling factor—takes less space. Built to ASME Code, inspected and stamped.
8. Equipped with long-life, *quiet* B&G Pumps—all substantially mounted and piped.
9. Easily serviced—every part accessible and replaceable.
10. Hammerloid finish jacket. Undercoated for sound-deadening.
11. Thoroughly cleaned, dried and fully charged with Freon.
12. Tubing brazed in inert gas atmosphere. Inside scale and dirt formation possibility eliminated.
13. Bends instead of fittings, reduce possibility of Freon leakage to a minimum.
14. Easier handling because of low center of gravity.
15. Non-recycling pump-down eliminates continuous pump-down system. Power saved through this feature.
16. 34° without freeze-up. Special B&G Chiller and anti-freeze Control System permits applications down to this low point.
17. Evaporator heater, as well as crank-case heater, eliminates slugging of the compressor.
18. Increment starters eliminate the necessity of resistor or auto-transformer starters.
19. Capacity control system assures greatest efficiency by balancing horsepower to load.
20. Sight glasses and test cocks permit easy and accurate checking of Freon charge.

Send for complete file of specifications and application data.

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I=B=R®

THE ONLY OIL-FIRED BOILERS

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THROUGH NET CAPACITIES TO

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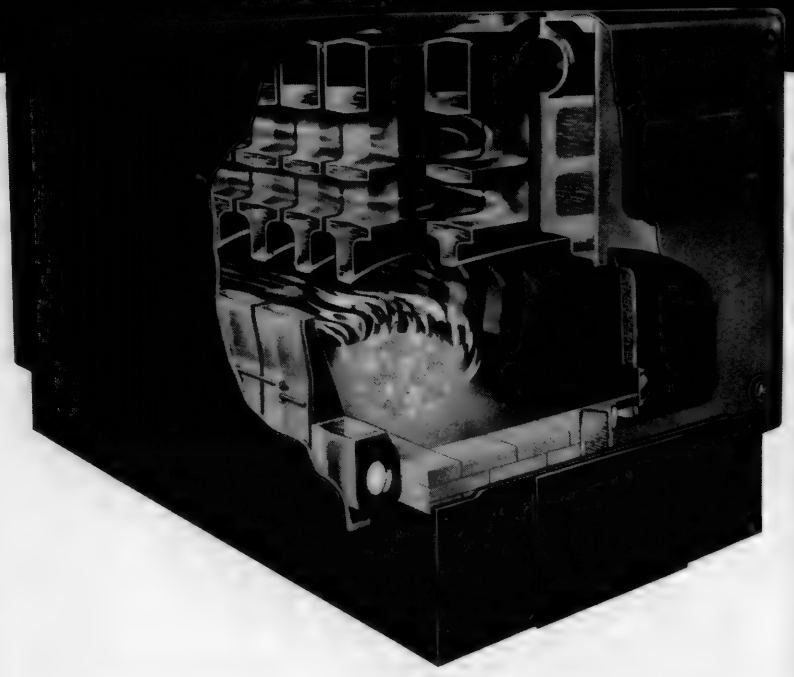
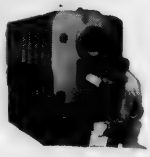


EASIER TO ERECT

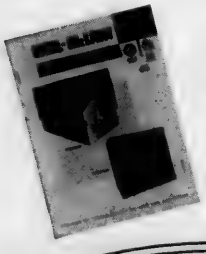
EASIER TO INSTALL BREECHING

EASIER TO BUILD COMBUSTION CHAMBER



EASIER TO INSULATE

EASIER TO ENLARGE CAPACITY



Send for catalog H-245 for data on Weil-McLain Gas, Oil and All-Fuel Boilers for commercial and industrial installations.

WEIL-McLAIN

Nos. 40 and 44

OIL and ALL-FUEL BOILERS

When you specify or install a Weil-McLain 40 or 44 Cast Iron Boiler, you can be sure that its capacity is exactly as published.

Weil-McLain ratings are established by actual output under test, based on the Institute of Boiler and Radiator Manufacturers' Testing and Rating Code for Low Pressure Cast Iron Boilers. These ratings eliminate guesswork... permit selection of correctly sized boilers.

Weil-McLain 40 and 44 Boilers are the practical selection for low pressure commercial and industrial heating systems. They can be installed in smaller boiler rooms, easily expanded in capacity and are designed to be easily maintained at top efficiency. Corrosion-resistant cast iron construction assures long, trouble-free life.

Address literature requests to Dept. BB-28

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BOILERS · RADIATORS

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Watch for this symbol!

It identifies dependable Air Moving Equipment

In months to come, you'll begin to see this symbol on most leading makes of air moving equipment. It will provide you with a means of identifying air moving equipment which will perform according to its published rating.

Use of the symbol is the outcome of a joint Canadian and U. S. cooperative program sponsored by the Air Moving and Conditioning Association to protect you from incorrect or improper performance ratings for such equipment.

Practically all leading manufacturers of air moving equipment are planning to qualify their standard products in tests made in accordance with the AMCA Standard Test Code and in laboratories inspected and approved by AMCA.

Each qualifying company will operate under a license agreement with AMCA basically requiring the following:

1. ***The manufacturer's laboratory must be approved by AMCA.***
2. ***Qualifying equipment must be tested in accordance with the AMCA Standard Test Code and published ratings must be in accordance with such tests.***
3. ***The manufacturer must maintain manufacturing control of the products involved so that the equipment will perform in accordance with published ratings.***

A public announcement soon will let you know when you may specify "according to AMCA Certified Rating." Until then, let us send you advance information on this program. If you specify equipment, write for Bulletin 153-57. If you are an equipment user, ask for Bulletin 152-57.

CERTIFIED RATINGS

Certified Ratings are the result of tests made by the manufacturer in accordance with Standard Test Codes adopted by the Air Moving and Conditioning Association, Inc. Air Moving and Conditioning Association, Inc., is successor to Industrial Unit Heater Association, National Association of Fan Manufacturers, Inc., and Power Fan Manufacturers Association.

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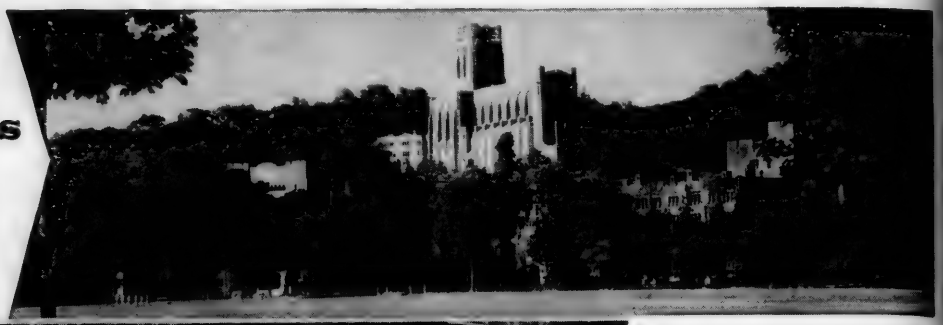
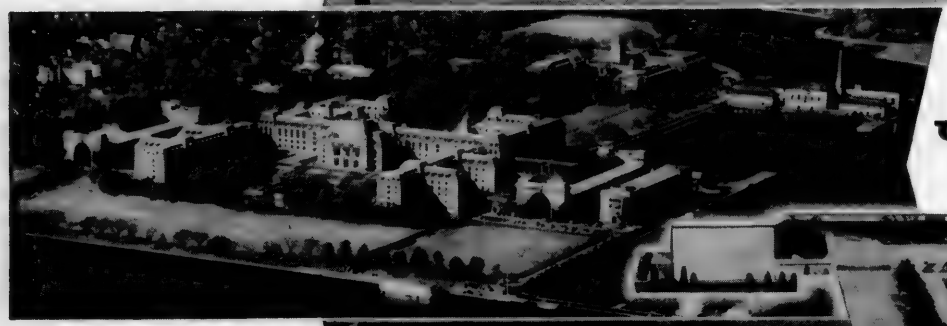
UNITED STATES MILITARY ACADEMY



UNITED STATES NAVAL ACADEMY



UNITED STATES AIR FORCE ACADEMY

Photographs courtesy United States Military Academy, United States Naval Academy, and United States Air Force Academy.

Ric-wiL underground piping systems serve ALL three...West Point, Annapolis and NOW...the new Air Force Academy

West Point and Annapolis have been serviced by Ric-wiL piping systems as far back as 1931. Since 1946 alone over 15,000 feet of Ric-wiL prefabricated piping has been purchased for the nation's top military colleges. Installation of Ric-wiL piping at the new 17,500 acre United States Air Force Academy has already been installed. Ric-wiL is indeed proud of the part they have played in serving these military academies for a period of over twenty-five years.

Quality Piping Systems . . .
. . . of Exceptionally High Thermal Efficiency
SINCE 1910

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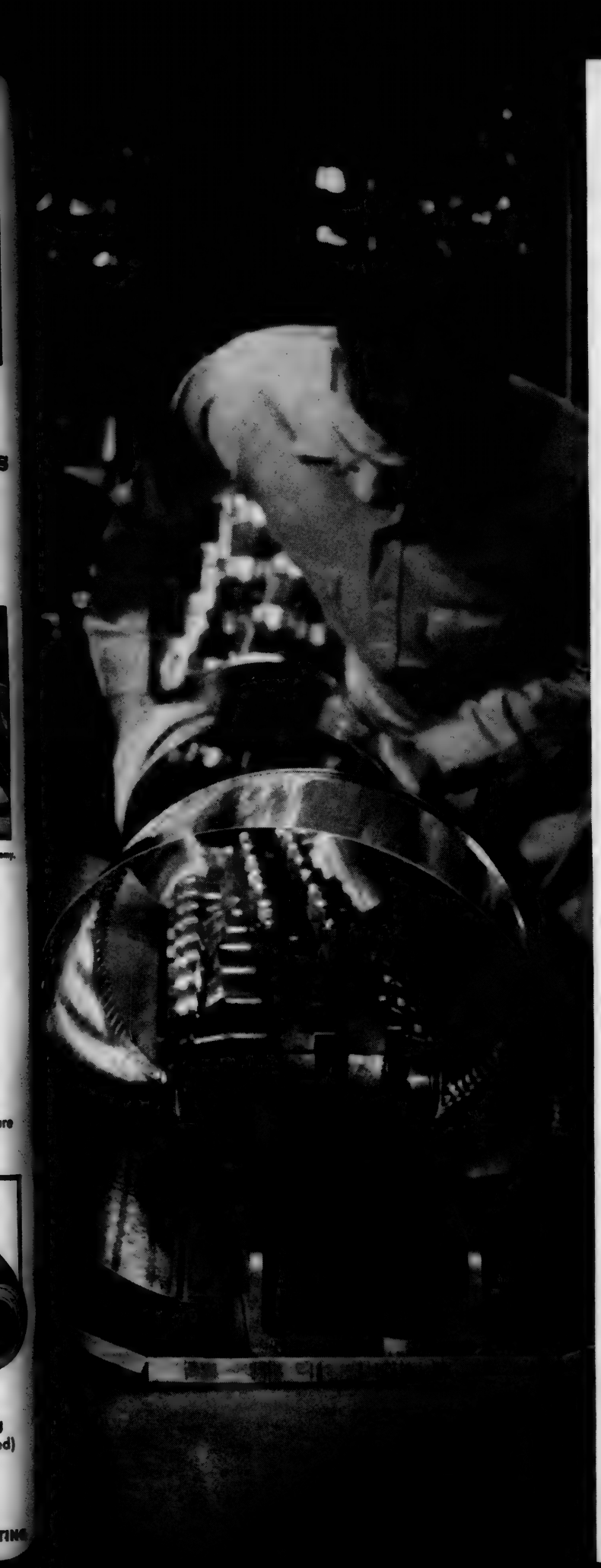

"We just don't worry about chipping or flaking when we lock-seam WEIRKOTE®!"

If those difficult lock-seaming operations give you trouble, it's time to take the step that fabricator after fabricator is taking.

Switch to Weirkote zinc-coated steel as promptly as you can.

Weirkote's continuous process integrates the zinc and the steel so that the most complicated short-radii bends are made without chipping or flaking. Weirkote can be worked to the very limits of the steel itself — spinning, deep drawing, crimping, heading, twisting, the works. Comes through in perfect shape to give your products lasting anti-rust protection, such as they've never had before.

Weirkote's made that way to behave that way. And *now* it's treated to inhibit wet storage (white oxide) stain.

Can you think of a quicker, easier step to an even better product? To fewer rejects? To more peace of mind? To lower costs? And, perhaps most important, to the greater good will of customers who receive even more value for their money?

Write today for the free booklet that will give you lots of food for thought on the many advantages Weirkote can bring to your products and production. Weirton Steel Company, Dept. N-1, Weirton, West Virginia.

WEIRTON STEEL COMPANY

WEIRTON STEEL COMPANY

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REVERE SOFT COPPER WATER TUBE
REVERE TYPE L 3/4" X 60'
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COPPER • BRASS • REVERE ALUMINUM
COPPER WATER TUBE
REVERE SOFT COPPER WATER TUBE
REVERE TYPE L 3/4" X 60'
DO NOT DROP
DO NOT DROP
COPPER • BRASS • REVERE ALUMINUM
REVERE SOFT COPPER WATER TUBE
REVERE TYPE L 3/4" X 60'
REVERE TYPE L
REVERE 3/4

Color bars run the full length of the 20-foot straight-length tubes, and show tube size and types about every 12 inches. In addition to the 3 shown, DWV is color-coded yellow. Cartons in which coiled Revere Copper Water Tube is shipped are stamped with the new color-coding identifications.

Inks used will remain fast while tube is being handled but will not interfere with soldering when normal cleaning procedures are used.

Coding A Big Hit . . .

. . . and a big time and money-saver to us in handling and installing

REVERE COPPER WATER TUBE,"

Says Mr. William R. Geiler, President
GEILER PLUMBING & HEATING CO.,
Cincinnati, Ohio

Continued Mr. Geiler, "From the minute it is delivered Revere Color-Coded Tube starts saving us time and money. In checking bills of lading, shipping tickets and double-checking against building specifications too, there is not only a lot of valuable time saved but there is less chance of mistakes being made. Anyone can spot the different types just by a fast glance. Even in the corners where the light is poor you can tell whether or not the tube being handled is 'K', 'L', 'M' or 'DWV.'

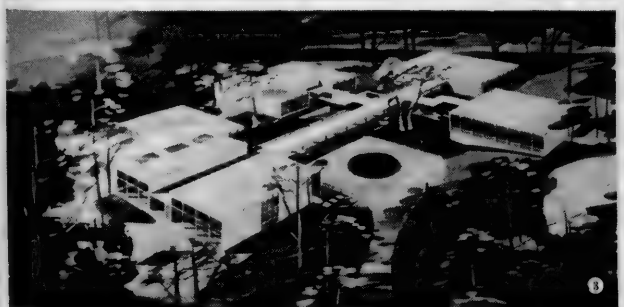
"This Revere color-coding is a wonderful time saver in our shop work and in checking inventories, too. Frankly, I don't know how we've done without this idea as long as we have. It's a real contribution to the plumbing trade. Our men *like* to handle Revere Color-Coded Tube."

REVERE COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

230 Park Avenue, New York 17, N. Y.

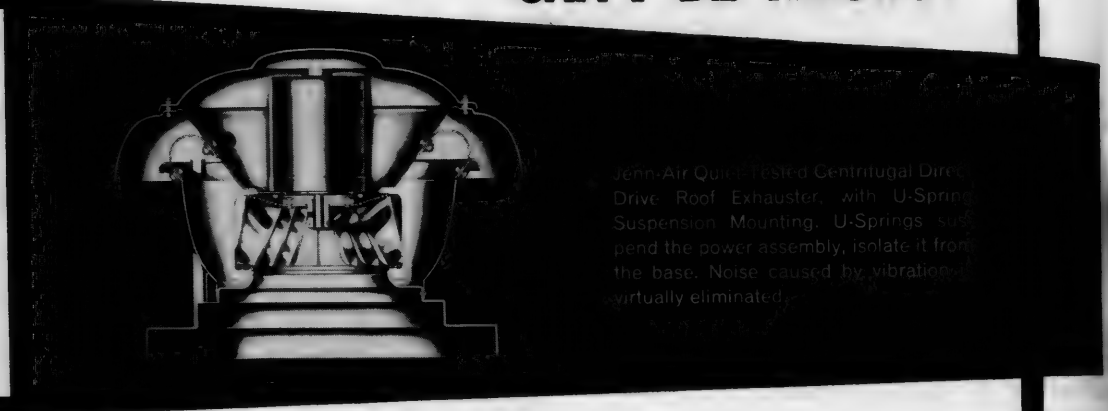
Mills: Rome, N. Y.; Baltimore, Md.; Chicago, Clinton and Joliet, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Brooklyn, N. Y.; Newport, Ark.; Ft. Calhoun, Neb. Sales Offices in Principal Cities, Distributors Everywhere.



4 OF THE 11 SCHOOLS in which GEILER PLUMBING & HEATING CO., is installing Revere Color-Coded Copper Water Tube, representing a total of some 35,200 feet . . . (1) WILLIAM HENRY HARRISON HIGH SCHOOL, Hamilton County, Ohio. (2) STEWART ELEMENTARY SCHOOL, Sharonville, Ohio. (3) HILLTOP ELEMENTARY SCHOOL, Wyoming, Ohio. (4) OAK HILLS HIGH SCHOOL, Hamilton County, Ohio.

Quiet-Tested... Now Time-Tested...

OVER 50,000 CASE HISTORIES CAN'T BE WRONG!



Jenn-Air Quiet-Tested Centrifugal Direct Drive Roof Exhauster, with U-Spring Suspension Mounting. U-Springs suspend the power assembly, isolate it from the base. Noise caused by vibration is virtually eliminated.

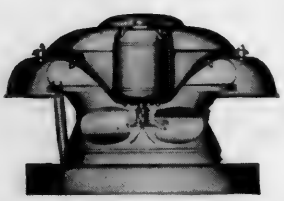
Why U-Spring Cushion Suspension Mounting... by JENN-AIR... has now been adapted to JENN-AIR Axial Roof and Centrifugal Wall Exhausters

Jenn-Air Quiet-Tested Centrifugal Wall Exhauster, with U-Spring Suspension Mounting. Eliminates most duct work. Provides a means of ventilation through the wall.

The Facts: Two years ago Jenn-Air incorporated U-Spring Cushion Suspension Mounting in its Quiet-Tested Direct Drive Roof Exhausters. Since then, over 50,000 units have been installed.

The Facts: Not a single failure has been reported. No breakage on record. No instance of shipping damage (wheel binding into inlet), a common occurrence in rubber insulated ventilators . . . Jenn-Air U-Springs absorb the shock of rough handling. Only six recorded cases in 50,000, where the U-springs failed to solve the noise problem.

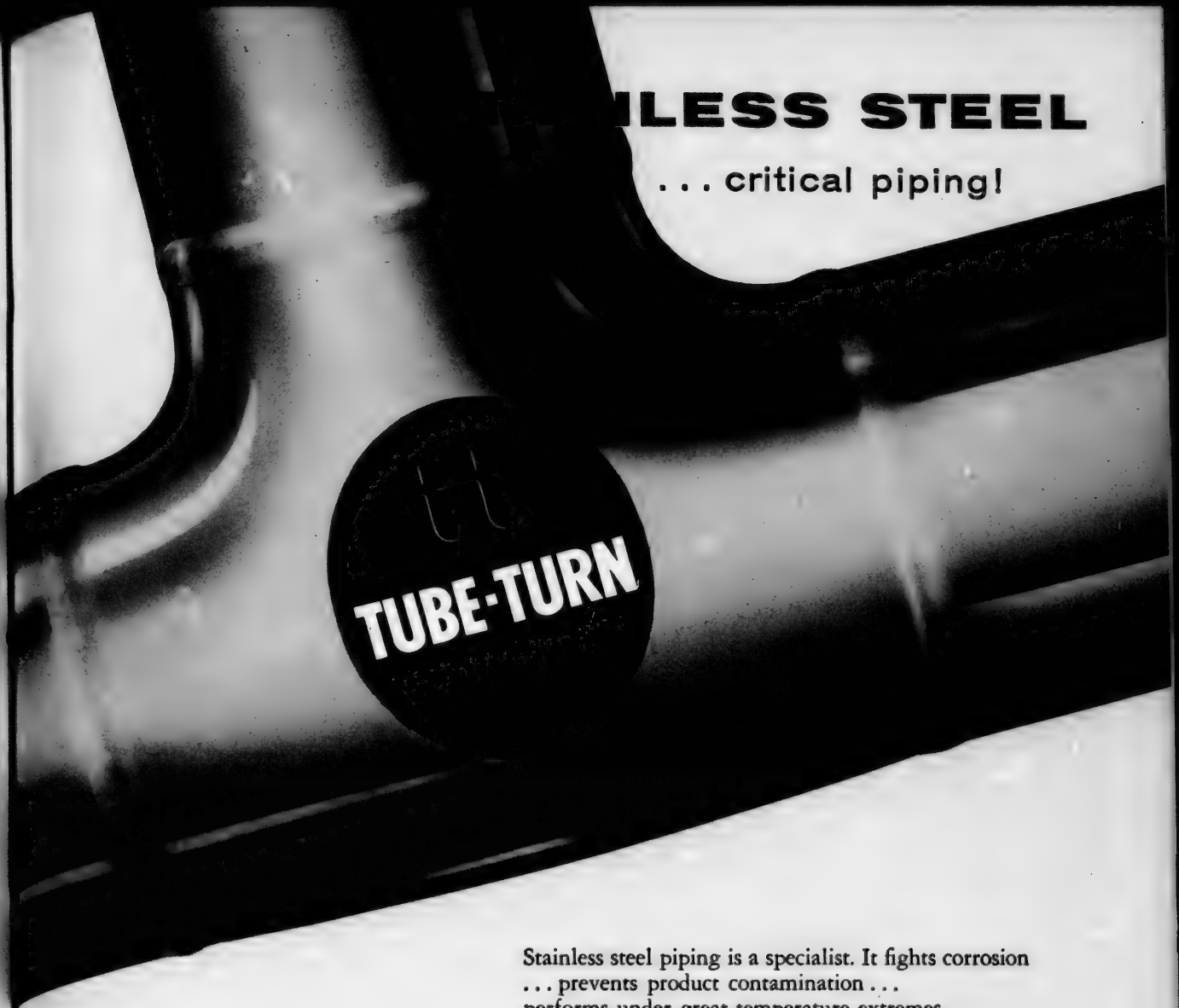
The Facts: U-Spring Cushion Suspension Mounting—which shows 44% less vibration transmission than rubber or neoprene—has now been adapted to Jenn-Air Axial Roof and Centrifugal Wall Exhausters. Another in the long line of Jenn-Air "firsts" that includes: *first* with *true* low contour design . . . *first* with spun aluminum construction . . . *first* with Quiet-Testing in Jenn-Air's exclusive Sound-Elec Test Chamber . . . *first* with motors lubricated for ten years of normal operation.



Jenn-Air Quiet-Tested Axial Roof Exhauster, with U-Spring Suspension Mounting. Recommended for general ventilation work and duct-type application.

The Facts explain why you can look to Jenn-Air for quality-engineered exhausters that never wait for the rest of the field to catch up.

JENN-AIR PRODUCTS COMPANY, INC.
1102 Stadium Drive, Indianapolis 7, Indiana
MEMBER, AIR MOVING AND CONDITIONING ASSOCIATION



ILESS STEEL

. . . critical piping!

. . . a critical place to safeguard your reputation with "TUBE-TURN" products

Stainless steel piping is a specialist. It fights corrosion . . . prevents product contamination . . . performs under great temperature extremes . . . is able to handle dangerous materials safely. Construction and maintenance dollars, often the safety of life and property, and *your reputation* are at stake in the selection of these materials.

When you specify TUBE-TURN* Stainless Steel Fittings and Flanges, you get extra-value features and greater strength at no extra cost. Fittings are marked with *complete* identification. Production procedures and quality control assure conformity to all code requirements.

Your nearby Tube Turns' Distributor can meet *all* your needs in welding fittings and flanges *promptly.*

*"TUBE-TURN" and "TT" Reg. U. S. Pat. Off.

TUBE TURNS LOUISVILLE 1, KENTUCKY

A Division of National Cylinder Gas Company

DISTRICT OFFICES: New York • Philadelphia • Pittsburgh • Chicago • Detroit • Atlanta • New Orleans • Houston • Midland Dallas • Tulsa • Kansas City • Denver • Los Angeles • San Francisco • Seattle

In Canada: Tube Turns of Canada, Ltd., Ridgetown, Ontario • Toronto, Ontario • Edmonton, Alberta • Montreal, Quebec • Vancouver, B.C.

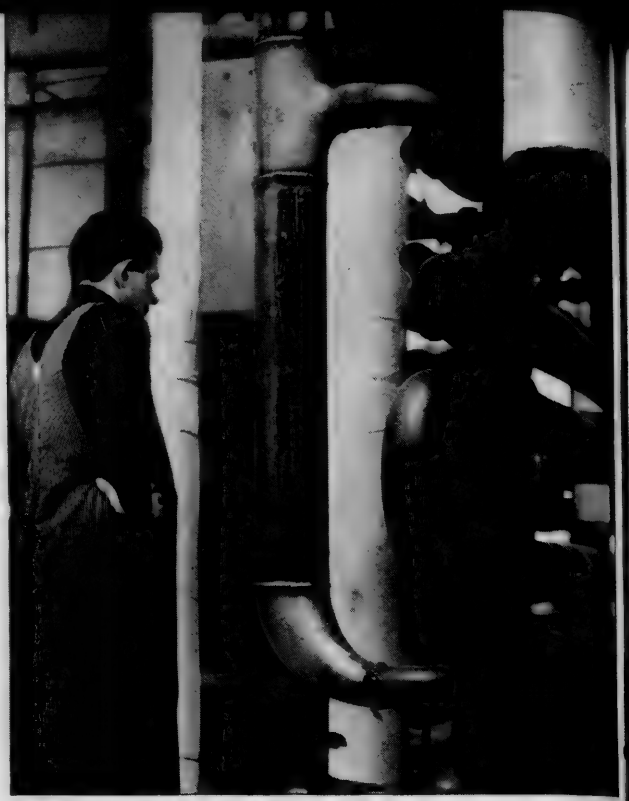
You get these extra values at no extra cost with

TUBE-TURN

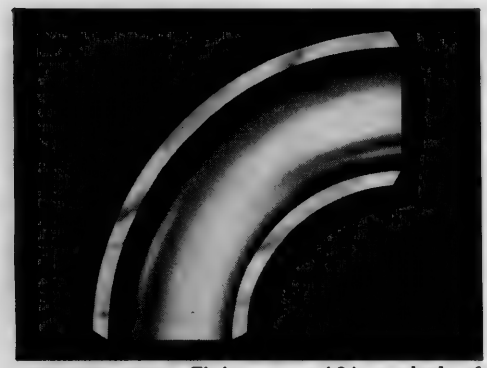
Stainless Steel Fittings

- Fittings meet *all* standard chemistry specifications
- Minimum wall thickness of elbows are at least 87½% of nominal
- All fittings meet calculated bursting pressure of matching pipe
- Qualified welders and procedures used where welding is required
- Each fitting properly solution heat-treated
- Each fitting passivated
- Special grades of stainless steel, and all other alloys available

Meet all codes: ASTM A403 (for material and manufacturing procedure); MSS SP43 and ASA B16.9 (for dimensions); and MSS SP25 (marking procedure).



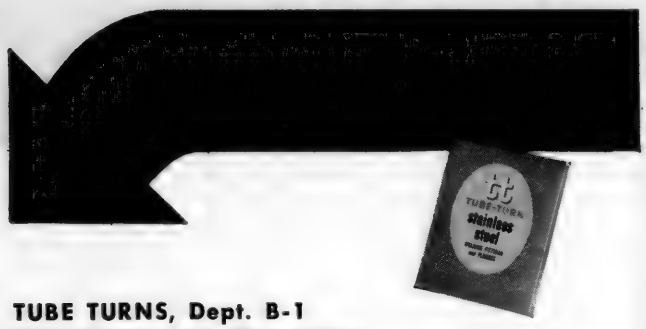
TUBE-TURN Stainless Steel Elbows and Tee in a petrochemical plant.



UNIFORM WALL. Fittings meet ASA standards of 87½% of nominal thickness . . . particularly important for light wall elbows. Many conventional stainless steel elbows are as much as 30% to 40% below nominal at this point of greatest wear. All TUBE-TURN® Stainless Steel Fittings, including tees, match calculated bursting strength of the pipe.

COMPLETE IDENTIFICATION. You *know* this fitting conforms to specified quality because the material type and quality control are fully identified. Manufacturer, size, wall thickness and schedule are also marked as shown on the fitting.

CUTS PURCHASING COSTS. You can order TUBE-TURN Stainless Steel Fittings from your nearby Tube Turns' Distributor . . . on the same order as other types of welding fittings in Tube Turns' line of 12,000 products. Cuts red tape. Saves time. Photo courtesy McJunkin Corporation, Charleston, W. Va.



TUBE TURNS, Dept. B-1
224 East Broadway, Louisville 1, Kentucky
Please send STAINLESS STEEL CATALOG.

Company Name_____

Company Address_____

City_____ Zone_____ State_____

Your Name_____

Position_____

Available from your nearby TUBE TURNS' Distributor

*"TUBE-TURN" and "U" Reg. U.S. Pat. Off.

TUBE TURNS

A DIVISION OF NATIONAL CYLINDER GAS COMPANY

LOUISVILLE 1, KENTUCKY

DISTRICT OFFICES: New York • Philadelphia • Pittsburgh • Chicago • Detroit • Atlanta • New Orleans • Houston • Midland • Dallas • Tulsa • Kansas City • Denver • Los Angeles • San Francisco • Seattle. **IN CANADA:** Tube Turns of Canada Ltd., Ridgetown, Ontario • Toronto, Ontario • Edmonton, Alberta • Montreal, Quebec • Vancouver, British Columbia.

Why world's most modern hotel chose Sarco...

heating specialties · steam traps · temperature regulators · fin-tube radiation

The New Philadelphia
SHERATON HOTEL
Rooms — 1000
Cost — $16,000,000

WHEN Philadelphia's new $16,000,000 Sheraton Hotel was planned, management deliberately set out to make it the last word in modern hotel design, construction and facilities . . . with unsurpassed QUALITY throughout.

For the heating system, requirements were most exacting . . . demanding not only the finest of equipment but very close and experienced manufacturer cooperation. That's why owner, architect, consulting engineer, and heating contractor agreed on:

Sarco Heating Specialties

Sarco strainers, radiator traps, radiator valves, balancing fittings, and air eliminators help insure quality heating all along the line. 103 Sarco Float Traps installed for dripping steam mains and equipment . . . because of high continuous-discharge capacity, proven reliability, and minimum maintenance.

Sarco Temperature Regulators

Specified for hot water tanks, because they're simple, SELF-POWERED, rugged, accurate. Quickly, easily installed. Seldom, if ever, require maintenance.

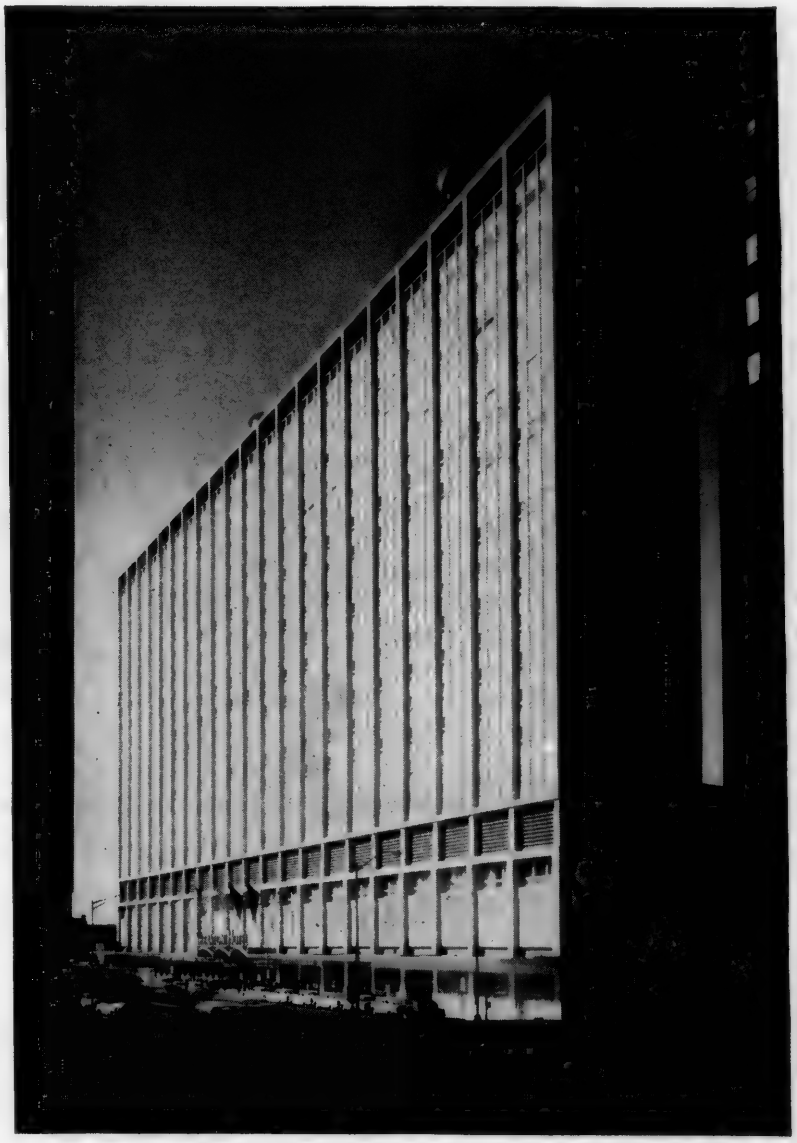
Sarcofin Radiation

One third mile of it chosen because of:— (1) dependable, high quality construction; (2) Sarco's field engineering service . . . with its on-the-job measurements and close cooperation with engineer and contractor; (3) ability to deliver custom-built radiation to critical dimensions.

Sarco Undivided Responsibility

Sarco . . . the single source of supply for this heating equipment . . . assumed complete responsibility for all of it. This unit responsibility simplified design, specification, and purchasing, made possible closer on-the-job coordination . . . insured the same high standard of quality for all heating products in the group.

SARCO COMPANY, INC.
635 Madison Ave., New York 22, N.Y.



Architects: Perry, Shaw, Hepburn & Dean, Boston, Mass. **Consulting Engineer:** Slocum & Fuller, New York City. **Heating Contractor:** Ambrose Augusterfer Corp., Philadelphia, Pa. **Builders:** McCloskey & Co., Philadelphia, Pa.

SARCO

2249-B

An affiliate of Sarcotherm Controls, Inc.

PRODUCTS YOU CAN REST YOUR REPUTATION ON

Three New Ways to

SAVE WATER

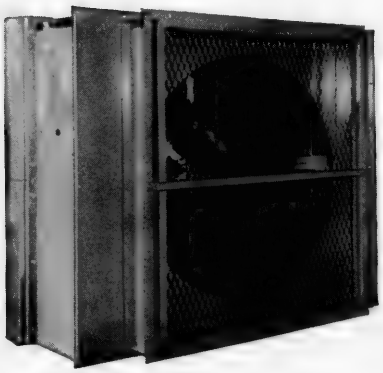
on air conditioning and refrigeration systems of 2 to 250 tons capacity ...and larger

Three new Carrier refrigerant condensers are shown on the page at the right—two of them air cooled and one evaporative cooled. Which will save the most money for your customer? That depends on the job—how big it is, what service it is designed to perform, and the conditions under which it will operate. But whichever you select, each will provide unique advantages. For complete information on these advanced new products and their application to your jobs, call the Carrier dealer listed in your Classified Telephone Directory or write Carrier Corporation, Syracuse, New York.

Carrier air conditioning · refrigeration · industrial heating

1

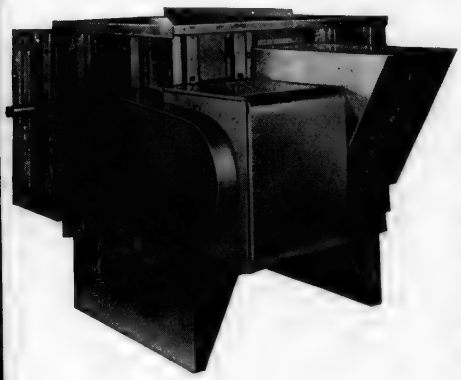
Model 9A Air Cooled Condensers for economy, light weight and compactness



Extremely flexible in application. Indoor or outdoor installation. Loads from 7½ tons to 45 tons handled by one of 10 basic sizes available. For larger loads—up to 540 tons—as many as a dozen of the basic units may be combined into a single condensing system with multiple circuits to serve varied air conditioning and refrigeration requirements. Units feature copper coils with aluminum fins, and an aluminum propeller fan housed in an integral aluminum casing. Model 9A units condense Refrigerants 12, 22 and 500 with equal efficiency.

2

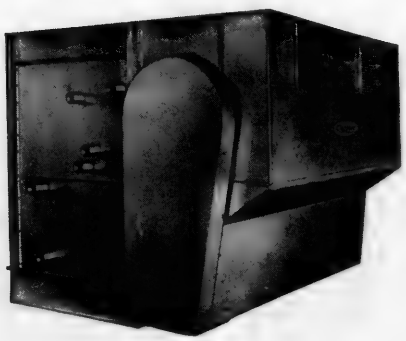
Model 9M Air Cooled Condensers for extra quietness or use with ducts



Provide high-capacity performance in limited space because of special coil and centrifugal fan. In seven low-silhouette sizes, with capacities from 2 to 38 tons. Special coil, with 14 aluminum fins per inch of tubing, packs more heat transfer into less space. Quiet centrifugal fan has ample power to draw air through ductwork, makes the 9M ideal for indoor installation for air conditioning. Offers vertical or horizontal air delivery indoors; horizontal only outdoors. Can be floor or ceiling mounted. Condenses Refrigerants 12, 22 and 500.

3

Model 9H Evaporative Condensers for peak efficiency under all conditions



Greatly improved in design, with exclusive new water distribution method that requires no spray nozzles or eliminators. Water is pumped to a pan at top of unit. Orifice holes in pan meter water evenly into a perforated lower pan, which breaks water into droplets that drench coil. Powerful centrifugal fans draw air quietly across coil, provide peak performance in all air conditioning and refrigeration applications. Units are lighter, lower, easier to service. In 13 sizes, 5 to 250 tons capacity. Condense all types of commercial refrigerants.

Air conditioned with
without loss of

London Guarantee Building was completed in 1923, air conditioned with TRANE equipment in 1957. Leslie H. Klawans and Company, Management Agent. Architects and engineers for the remodeling job were Robert E. Hattis Engineers, Inc. Heating and refrigeration contractor was Advance Heating and Air Conditioning Corporation. Ventilation contractor was Narowetz Heating and Ventilating Company, all of Chicago.

Trane equipment
rental-income space

Year-around air conditioning system installed with almost no disturbance of tenants

The building: London Guarantee Building, 360 North Michigan Avenue, Chicago, Ill.—with 200,000 square feet of rentable office space.

The problem: *Ten* exterior exposures gave this building a large percentage of exterior space. Each floor is divided about 80% exterior offices and suites; 20% interior office areas. Problem was to install complete, year-around air conditioning in as short a time as possible . . . with a minimum of disturbance to tenants . . . and as economically as possible with respect to both space and dollars.

The solution: TRANE equipment met all the above requirements and the building owners didn't lose any income due to space loss. 918 TRANE Fan-coil Uni-Trane units—each with outside air intakes to meet Chicago code—were installed in all exterior spaces to provide individual climate control. Installation was made on a module basis for maximum flexibility in meeting future remodeling requirements.

The twenty interior zones (one for each floor) were conditioned with TRANE Climate Changers. These units were installed in an abandoned elevator shaft, so required no rentable space. The main refrigeration equipment (two TRANE CenTraVacs) was installed in the existing boiler room.

The entire air conditioning job was completed in six months' time, with air conditioning available to tenants on June 1, 1957.

In planning air conditioning for new or existing buildings, more and more architects and engineers are turning to TRANE equipment. There are TRANE units for any kind of building, any type of system. And TRANE *matched* equipment works together to save space, cut costs, speed installation. Have your architect or consulting engineer call your nearby TRANE Sales Office or write TRANE, La Crosse, Wisconsin.

For any air condition, turn to

TRANE

MANUFACTURING ENGINEERS OF AIR CONDITIONING, HEATING, VENTILATING AND HEAT TRANSFER EQUIPMENT

THE TRANE COMPANY, LA CROSSE, WIS. • SCRANTON MFG. DIV., SCRANTON, PA. • TRANE COMPANY OF CANADA, LTD., TORONTO • 96 U.S. AND 18 CANADIAN OFFICES

918 Fan-coil UniTrane units provide individual climate control for London Guarantee Building. Units are installed on a module basis to permit flexibility for future tenant remodeling. TRANE Fan-coil units were chosen for their ease in converting existing steam heating system to hot water for heating, chilled water for cooling.

Two TRANE CenTraVacs, hermetic centrifugal compressors, supply chilled water for summer cooling. CenTraVacs were installed in the existing boiler room. Operation of CenTraVac is *automatic*—unit paces itself to supply just the amount of refrigeration needed . . . modulates down to 10% of full load capacity or lower.

Twenty TRANE Climate Changers condition the air for open office areas in London Guarantee Building. Installed in an unused elevator shaft, Climate Changers required no rentable space. Available in single zone or multi-zone models, Climate Changers heat, cool, ventilate . . . meet a variety of air conditioning requirements.

BARBER COLMAN

Architects:
Loebl, Schlossman & Bennett, Chicago

Electrical and mechanical engineers:
William Goodman and Associates, Chicago

Air conditioning contractor:
Narowetz Heating and Ventilating Company

America Fore Insurance Group Building

230,000 sq ft

Fully air conditioned

Five fan systems plus perimeter radiation

Barber-Colman Electrionic Control Center, incorporating complete freeze-up protection

Uni-Flo ceiling and side-wall diffusers, high-velocity air valves, and return grilles

Another Barber-Colman comfort combination

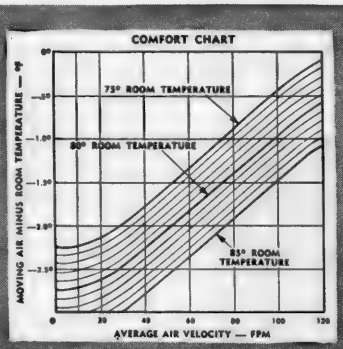
Contact your nearby Barber-Colman Field Office

See how the Barber-Colman comfort engineer offers better assistance and assures better results through *combined* automatic controls and air distribution

one source...one responsibility.

America Fore selects Barber-Colman for comfort insurance

More and more engineers and architects throughout the country are realizing the advantages of an exclusive comfort system—a combination of Electrionic automatic controls and Uni-Flo engineered air distribution products from one source, Barber-Colman. The Barber-Colman comfort engineer will consult during the design, will assume responsibility for the selection and placement of equipment and is available for supervision of installation and final balancing of the combination system. To engineers and architects, that means a comprehensive analysis of a project's automatic control and air distribution requirements and a clear definition of responsibility concerning these vitally related products, eliminating the delays resulting from conflicting obligations.



Comfort Standards

A chart, developed and used by our engineers, indicates conditions of air movement and temperature in occupancy zone. Line shown for each average room temperature is limit of satisfactory comfort conditions. Points above line fulfill Human Comfort Standards. Copies available upon request.

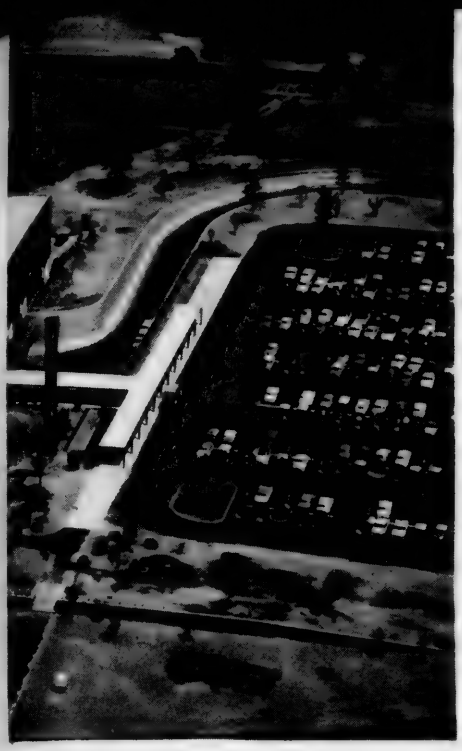
New fully illustrated bulletin details advantages of temperature control and air distribution system combinations available through Barber-Colman. Ask for Bulletin F-832.

BARBER-COLMAN COMPANY

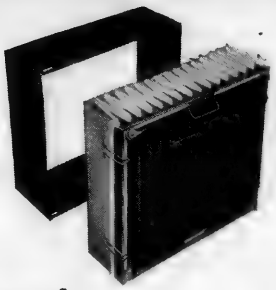
Dept. B, 1602 Rock Street, Rockland, Illinois

Connecticut General Life Underwrites Better Air

Architects: Skidmore, Owings & Merrill; Interior Designer: Knoll Associates, Inc.; Engineers: Weiskopf & Pickworth (structural) Syska & Hennessy, Inc. (mechanical, electrical); Consultant: BUILDING METHODS & MATERIALS: Walter C. Voss; Acoustical Consultant: Bolt, Beranek & Newman; Sculpture: Isamu Noguchi; General Contractor: Turner Construction Co.



with AAF FILTERS!



Airmat PL-24 filters selected for all-important air cleaning job

The new home office building of Connecticut General Life Insurance Company in Bloomfield is, without question, one of the outstanding architectural designs of the decade. Complete with artificial lake and a dining wing that overhangs a reflective pool, the building was designed with Connecticut General's *people* in mind. Virtually all of the Company's 2000 home-office employees are within 35 feet of a window, looking out on either a garden court or an expanse of the 275-acre tract in its natural state.

An important part of this "design for people" was clean air. The men who designed and built this striking building gave the same care and attention to the selection of air filters that was given to every other detail. From AAF's complete filter line, they selected the Airmat PL-24 to provide 650,000 cfm of better air.

The Airmat PL-24 is the world's most efficient mechanical filter for ventilating and air conditioning service. It packs 28½ square feet of filtering area into a compact 2′ x 2′ x 8″ unit . . . features low-cost renewable paper media and unit construction for simplified maintenance. For complete information on the Airmat PL-24 renewable-media air filter, call your local American Air Filter representative or write direct for AAF Bulletin No. 230.

AAF Dust Control Equipment

Illinois Heating Specialties

AAF herman nelson

American Air Filter
COMPANY, INC.

294 Central Avenue, Louisville 8, Kentucky
American Air Filter of Canada, Ltd., Montreal, P. Q.

BETTER AIR IS OUR BUSINESS

Herman Nelson Unit Heaters

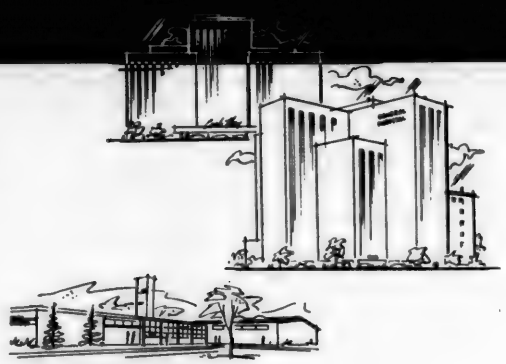
Herman Nelson Unit Ventilators

your job* calls for the best and...

in Fire Protection Equipment there's only one best:

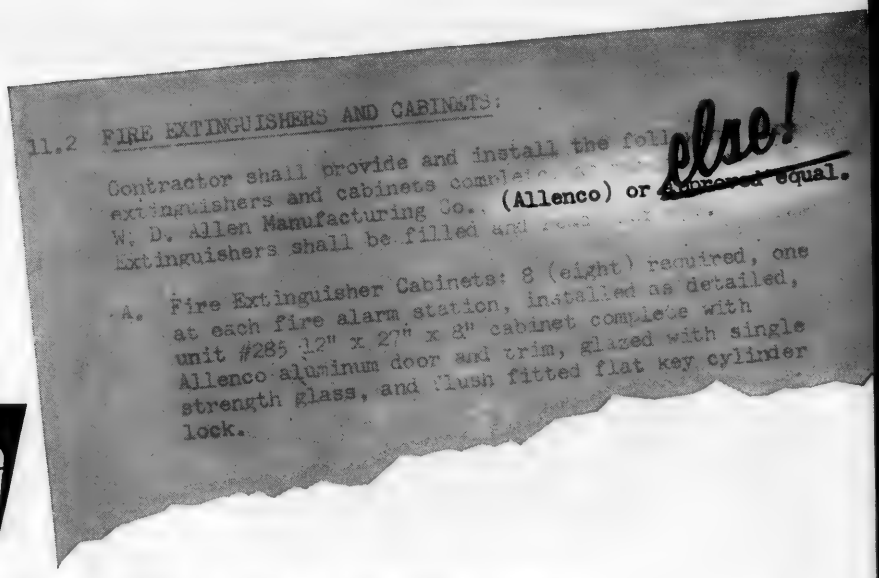
ALLENCO

**Commercial and Public Buildings, Hotels, Hospitals, Schools, Churches, Multi-Unit Residential Buildings*



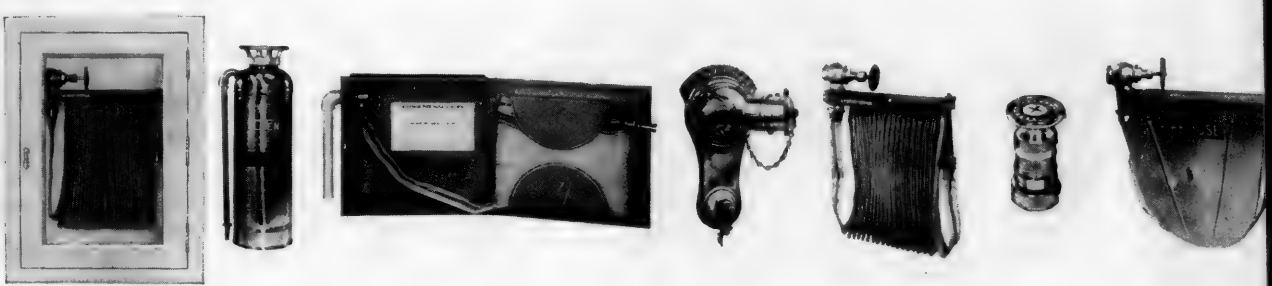
See why **ALLENCO** **leads year-in and year-out . . .**

- Ask architects, engineers, contractors or fire authorities
- Check Sweet's or Domestic Engineering catalog directory
- Write for your own copy of Catalog 150—A.I.A. file 29e2


11.2 FIRE EXTINGUISHERS AND CABINETS:
Contractor shall provide and install the foll
extinguishers and cabinets comple
W. D. Allen Manufacturing Co.
Extinguishers shall be filled and
(Allenco) or
elsa!
equal.
A. Fire Extinguisher Cabinets: 8 (eight) required, one at each fire alarm station, installed as detailed, unit #285 12" x 27" x 8" cabinet complete with Allenco aluminum door and trim, glazed with single strength glass, and flush fitted flat key cylinder lock.

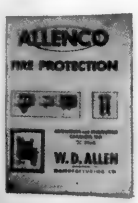
best for *specifying

- Wide selection to meet *any* requirement of code or insurance, structure or design, owner's operation or budget
- Detailed data *and* ready-to-copy standard specs in catalog form and also from nearby, reliable Fieldmen
- Best known *name*, thoroughly backed by manufacturer



best for *installing

- No delays: prompt quotes; accurate rough-in data; delivery on time *and* as specified
- Lower costs: competitively priced; goes in faster, needs no more work
- Reliable: on-the-job help as needed; lasting good looks and service



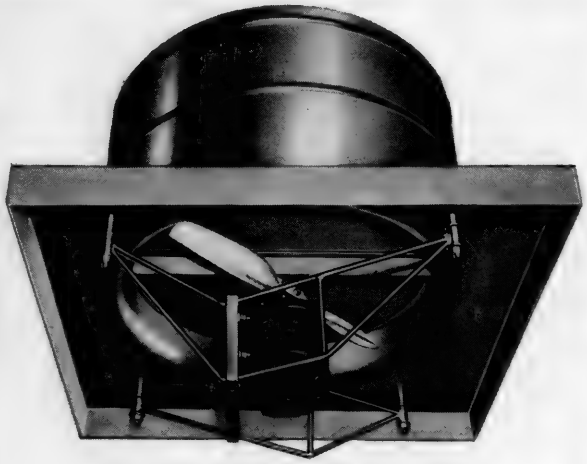
*Write for catalog, or phone your Allenco Fieldman listed in Yellow Pages.

SINCE 1889

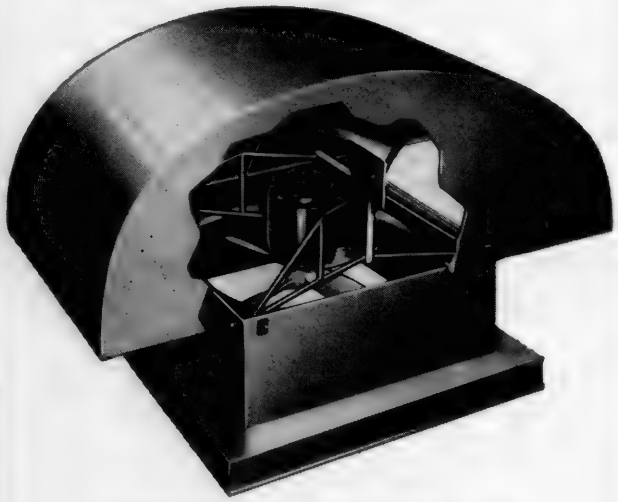
W. D. ALLEN MANUFACTURING CO.

ROOM 500, ALLENCO BLDG., 566 W. LAKE ST., CHICAGO 6, ILL.

Design Simplicity OF HARTZELL *roof ventilators means...*



HARTZELL VERTIJET — Windband formed from 20 gauge galvanized steel, base from 14 gauge zinc-grip coated steel. Fan ring is integral part of base sheet. Two semicircular galvanized lids at base of windband open automatically when fan goes on, close weather-tight when it goes off. Throat sizes from 18" to 60"



HARTZELL REVERSIBLE ROOF VENTILATOR—One unit does the job of two conventional one-way ventilators. This unit moves air in either direction with equal efficiency; you convert from intake to exhaust at the flick of a switch. Throat sizes from 28" to 44".

Why You Can Count on Hartzell Air-Moving Equipment for Long Life, Rugged Reliability and Minimum Maintenance

Hartzell fans and blowers are engineered and built for the exacting requirements of tough industrial service. There's no compromise with quality for the sake of shaving a few dollars on price. Hartzell fans are designed for the industrial buyer who is willing to pay for long life, dependable service and low maintenance.

HIGH EFFICIENCY...

These Hartzell roof ventilators expel large volumes of heat, smoke and fumes quickly and efficiently because simplified design reduces obstructions to air flow. There's no maze of interior braces and supports. And all Hartzell roof ventilators are tested for performance in accordance with Standard Test Codes of the American Society of Heating and Air Conditioning Engineers.

LOW INITIAL COST...

Elimination of complications of design and construction produce savings in production costs which are passed along to you. Hartzell design simplicity means that Hartzell roof ventilators can offer top quality construction for long life and dependable service at a price much lower than that of more complex designs.

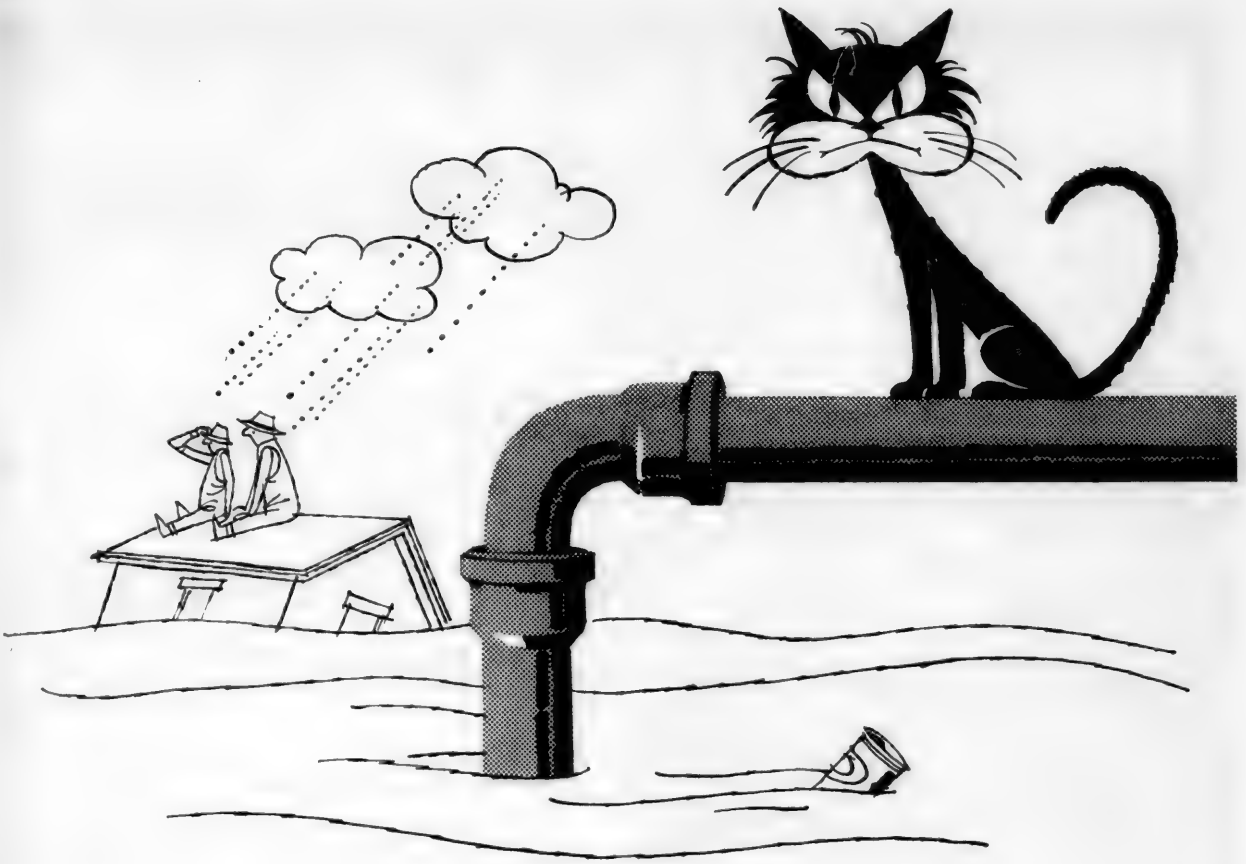
MINIMUM MAINTENANCE...

By minimizing the number of moving parts Hartzell reduces the number of things that can go wrong. Lids on vertical discharge models are mounted on corrosion resistant brass rods which turn on heavy Micarta plastic bearings which require no lubrication... won't stick, won't rust. Fan motors are ball-bearing type, conservatively rated for continuous performance. Under normal operating conditions, the only maintenance required will be periodic motor lubrication.

Write today, or ask your nearby Hartzell field engineer for a copy of the free Bulletin A-112A. It contains all the specifications for the two roof ventilators pictured, as well as for Hartzell's Airjet, Rotary and Penthouse roof ventilators.

HARTZELL
PROPELLER FAN CO.
Div. of Castle Hills Corp.
203 Thomas Blvd. • Piqua, Ohio

ENGINEERING OFFICES IN PRINCIPAL CITIES



withstands most corrosive forces!

Duriron pipe is high silicon iron *throughout* the thickness of the pipe wall. It's highly corrosion resistant; more than that, it generally outlasts the building itself. For these reasons, and because it can be installed by ordinary plumbing methods, Duriron is the *one* permanent piping specified for corrosive waste disposal systems by architects and engineers for more than 30 years. Insist on *Duriron.*

Duriron pipe and fittings are available from stock through leading plumbing jobbers in principal cities.

DURIRON® *CORROSION RESISTING DRAIN PIPE*

THE DURIRON COMPANY, Inc.

Dayton, Ohio

DURIRON

LOOK FOR THE NAME ON EVERY PIECE

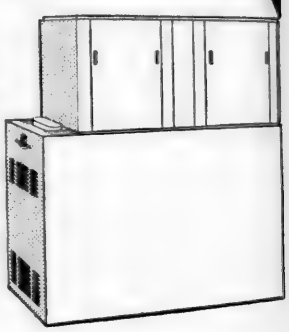
YORK Invades the Heating Market

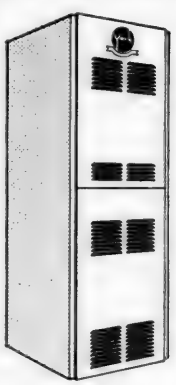
WITH A COMPLETE NEW LINE OF "SPACE COMMAND" FURNACES!

NOW TAKE CHARGE
of the complete market for both heating and air conditioning with York!

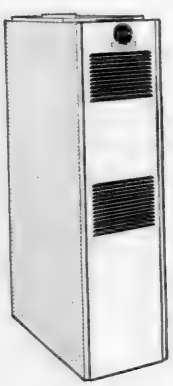
CONQUER
the space heating problems of every size and type building!

EXCLUSIVE '58 YORK COMFORT CENTER
Features heating, cooling, humidifying, dehumidifying and electronic filtering all in one beautiful, compact unit. York cooling circuit backed by full 5-year Protection Plan. Plus-efficiency gas heating unit fully AGA approved. Entire system controlled by smartly styled York thermostat.

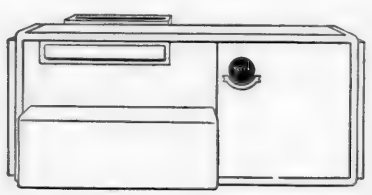




'58 YORK CHALLENGER FURNACE
Oil fired. Plus features include atomizing Burners...Positive Filtering...Metal Inner Liner... Lifetime Combustion Chamber ...Welded Heat Exchanger Joints...Fully Automatic Operation...Heavy-Duty Blowers. Upflow, Counterflow, Basement or Horizontal types. Also available in gas fired models.



'58 YORK CLIMASTER SERIES
Gas fired. Has Draft Diverter... Positive Filters...Heavy-Duty Blower...Cast Iron Burners. Adaptable to "add-on" air conditioning. Basement, Upflow, Counterflow and Horizontal types. Also Oil-fired models available.

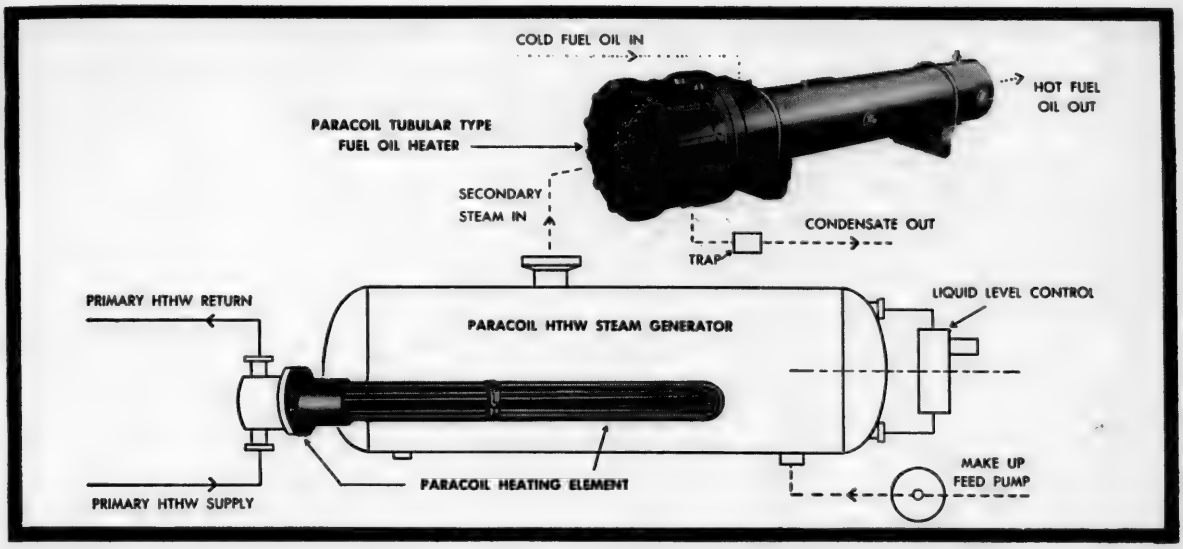


Your FUTURE and FORTUNE Now Lies With YORK

York Corporation, York, Pa.
Subsidiary of Borg-Warner

CUT ALONG DOTTED LINE AND SAVE

Idea no. 1 from Paracoil



How to use secondary steam to pre-heat no. 6 oil in a High Temperature Hot Water system

Paracoil engineers know that the first consideration in the design of an oil preheating system for an HTHW installation must be absolute freedom from the possibility of oil leak contamination of the main HTHW stream. A completely isolated oil preheater circuit is recommended. This can be accomplished by means of a secondary heat transfer circuit that does the actual heating. In this way, only the secondary circuit is exposed to possible contamination — the main HTHW circuit is protected at all times.

One of the ways that this isolation is achieved is illustrated above. Additional isolation circuits will be commented upon in future "Idea Sheets". Watch for them!

How to design a protective circuit

1. **Install a steam generator.** Use a Paracoil Heating Element with the HTHW main energy stream as its heat source. With water at 350° F, steam at 25 psig (267° F) can be easily generated in an economically sized unit.
2. **Use the steam thus generated** . . . to heat the fuel oil in a Paracoil Tubular Oil-Type Fuel Oil Heater.* This type heater provides the highest rate of heat transfer — more than **three times** that of the conventional straight tube type.
3. **The condensate from the oil heater** . . . may be returned to the steam generator or sent to waste depending upon plant policy. If the re-use of the condensate is important, absolute surety of its quality can be obtained through the use of the Paracoil Oil Leak Condensate Inspection System.*

Paracoil engineers have designed and built many oil preheater protective systems for both stationary and marine installations. They now offer their experience and know-how to all who are involved in HTHW activities.

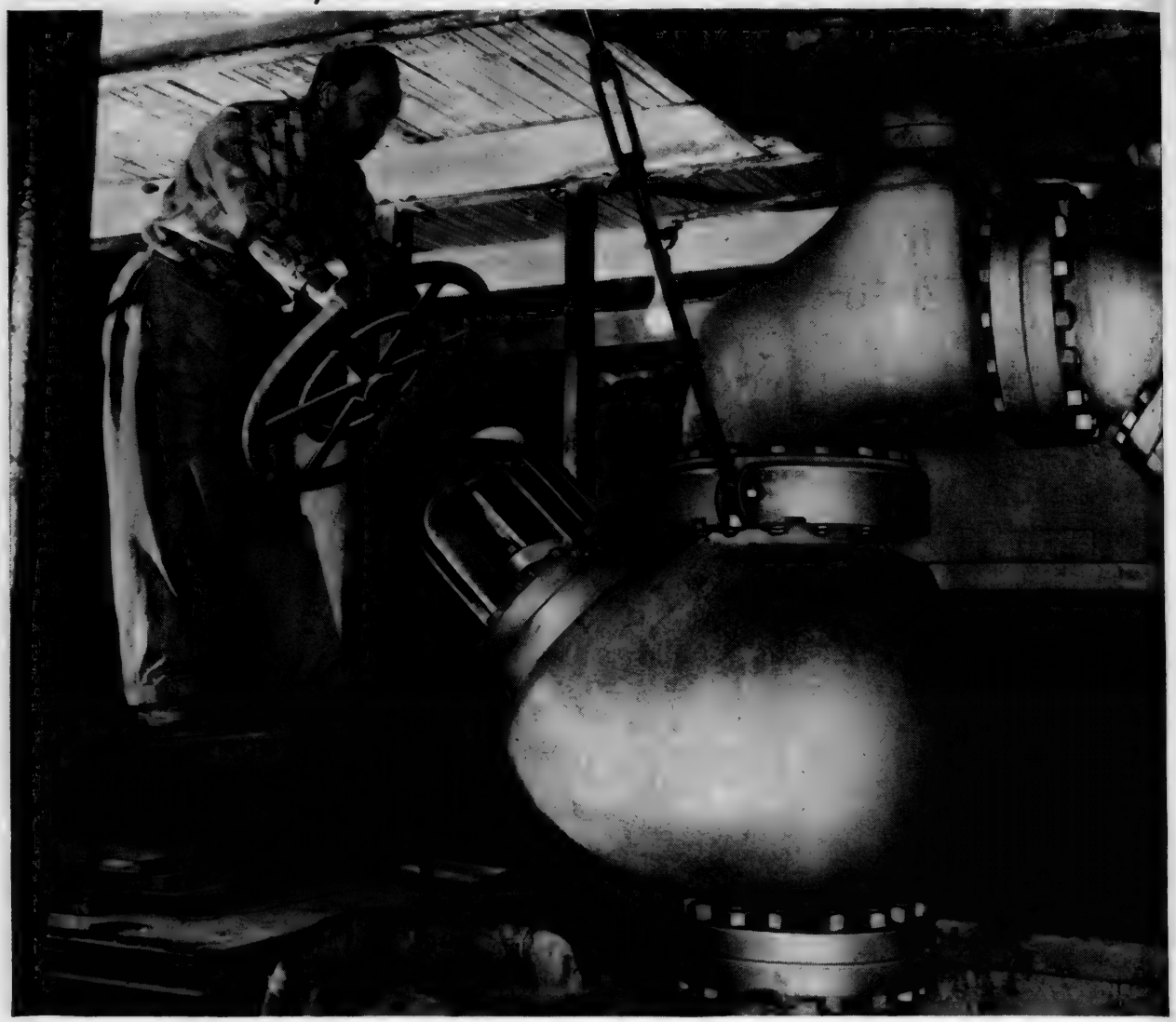
Write for complete data.

DAVIS ENGINEERING CORPORATION

30 Rockefeller Plaza, New York 20, New York • Circle 6-5650

CUT ALONG DOTTED LINE AND SAVE

Crane Valves Pay for Themselves in Trouble-Free Maintenance

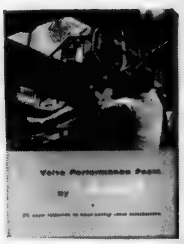


Beginning another 50 years of cost-free valve service

This remarkable case history proves how the right valve can save money in repairs and maintenance—again and again.

This Crane 10-inch stop-check valve has been in use since 1906 at Seattle Cedar Lumber Mfg. Co., Seattle, Wash. Operating at 360° F. and 150 psi., the valve is closed every third or fourth night when one of 3 boilers is shut down. The valve is also closed every 3 weeks when the boiler is down for inspection and cleaning. About a year ago, this Crane No. 28E Ferrosteel valve was opened for inspection, cleaned up, and put back into service. Repair parts needed? None.

In short, all 50 years have done to this Crane valve is emphasize how rugged and dependable it has proved, and how important it is to use quality valves on every service. For complete information on any valve problem, contact your Crane Representative.



YOU'LL FIND GOOD tips on valves in "Valve Performance Facts"—32 case histories throughout industry. Ask your Crane Man for a copy or write to address below.

CRANE VALVES & FITTINGS

PIPE • PLUMBING • KITCHENS • HEATING • AIR CONDITIONING

Since 1855—Crane Co., General Offices: Chicago 5, Ill. Branches and Wholesalers Serving All Areas

FIRST OF A SERIES OF **DATA SHEETS** REMOVE AND RETAIN

NEW: THE DRAFT CONTROL THAT SERVES ALL FUELS

The Field Triple-Fuel M+MG2

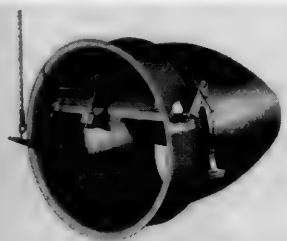
APPLICATION DATA: A triple-fuel draft control, designed for oil, oil-gas, gas, and coal-fired furnaces and boilers with 10″ through 32″ outlets, either natural, induced, or forced draft.

DESIGN DATA. The M+MG2 is a precision-made, three-fuel control. Because it is a control of extreme sensitivity, it is, of necessity, a control of extreme structural strength. For example, accuracy is increased when the clearance between a ring and gate is held to a minimum. To permit this, in the M + MG2, without risk of binding, Field developed a die-formed, heavy gauge ring that is the strongest ever offered on a draft control. Its deflection strength exceeds many fold the normal requirements of shipping, installation or use. The gate is also the heaviest made — 39 pounds for a 32 inch control. Such weight obviously provides extreme rigidity. Heavy weight is also, paradoxically, a requirement of the virtually friction-free mounting that gives the M + MG2 its extreme sensitivity. Only a heavy gate could be so delicately balanced. The same weight factor also prevents the spurious responses to which so sensitive a gate might normally be subject.

The M + MG2 gate is mounted on a long, thin, stainless steel knife edge, which in turn rests on self-aligning bearings. The bearings are self-cleaning. Soot or dirt cannot accumulate to cause binding or friction. They are also self-levelling — assuring that the knife edge is always in contact across the full width of the bearing, for an even distribution of weight. When the gate moves, only the sharp corner of the knife edge rests on the bear-

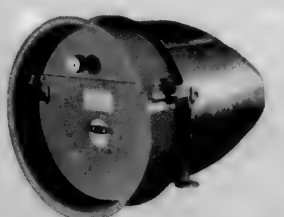
Remove and file for reference.

Perforated for easy tear-out.



M+MG2 Barochek for Solid Fuels

A triple-fuel control, the M+MG2 requires only minor, on-the-job changes to handle different fuels. Fuel conversions cannot obsolete this control.



M+MG2 Single-Acting for Oil

M+MG2 Double-Acting for Gas

The Field Type M+MG2

ings — an area of contact so minute that friction is virtually non-existent. The result is extreme and instantaneous sensitivity to draft change. The gate is deeply recessed in the ring, to direct the flow of air over the gate and avoid response to random, variable air conditions outside the control.

The M + MG2 permits an unusually wide range of draft settings. The 18″ control, for example will maintain a draft setting as low as .002″. The same control will maintain a draft as high as .35″, a requirement where there is a very high draft loss through the appliance. Compensation for differences between horizontal and vertical installation is fully provided, by the simplest means available on any Field control. Where a safety switch must be specified, to meet gas code requirements, attachment is easily, effectively, and compactly made. Compactness is a characteristic of the M + MG2. There are no protruding parts. Even the stainless steel bead chain is short, holding setting weights neatly against the side of the control.

The M + MG2 is a heavy control, and it is strong to a degree even beyond what its weight implies. For actual weights, sizes and other data, see the table below.

Data Sheet No. 2 will cover Application Engineering.

PHYSICAL DATA

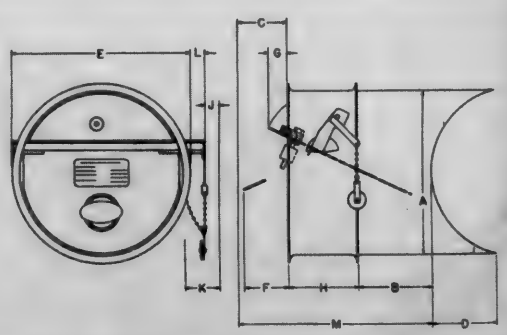
Control Size	Nominal Capacity Sq. In.	Recom. Pipe Sizes Dia.	Recom. Pipe Sizes Circum.	A	B	C	D	E	F	G	H	J	K	L	M	Shpg. Wt. Comp.	Shpg. Wt. L.C.	Vol. (Cu. Ft.) Comp.	Vol. (Cu. Ft.) L.C.
10	78.5	9 & 10	28¼ to 31½	10	4⅜	10	4¼	11	3¾	1⅛	4¾	1	3½	1	19⅛	9½ #	7½ #	.76	.49
12	113	11 & 12	34½ to 37¾	12	5¾	12	5	13¼	4⅜	1¾	4¾	1	3½	⅞	22½	11½ #	8½ #	1.32	.70
14	154	13 & 14	40¾ to 44	14	7⅛	14	5¾	15½	5⅜	2⅛	5⅛	1	3½	⅝	26¼	17 #	11 #	2.12	1.03
16	201	15 & 16	47 to 50¼	16	8⅜	16	6½	17½	6⅛	2⅜	5⅝	1½	4	¾	30	28 #	17¾ #	3.1	1.41
18	255	17 & 18	53½ to 56½	18	9¼	18	7½	19½	6⅞	2¾	7⅜	1½	5¼	1⅛	33⅛	34 #	22½ #	3.98	2.01
20	314	19 to 21	59¾ to 66	20	9⅝	20	8½	22	7⅝	3	7¾	1½	6¼	1¼	37⅜	42½ #	28¼ #	5.65	2.90
24	452	22 to 25	69 to 78½	24	12⅜	24	10½	26	9¼	3⅜	8⅜	2	6¼	1¼	45¼	65 #	44 #	7.18	4.35
28	616	26 to 30	81¾ to 94¼	28	13⅜	28	*	30½	10¾	4⅛	11⅜	2	6¼	⅞	52½	85 #	59 #	7.80	7.80
32	804	31 to 34	97½ to 107	32	15⅜	32	*	35	12¼	4¾	12⅛	2	6¼	⅝	59½	123 #	88 #	12.20	12.20

*No Points On These Collars

MATERIAL GAUGES

Size	Ring	Gate	Collar
10	20	18	24*
12	20	16	24*
14	20	16	22*
16	18	16	18*
18	18	16	18*
20	18	16	18*
24	18	14	18*
28	16	14	14**
32	16	14	14**

*Galvanized **H.R.P.O. with Enamel Finish



FIELD CONTROL DIVISION

H. D. Conkey & Company, Mendota, Illinois

AFFILIATES:
Conco Building Products, Inc. • Brick, Tile, Stone — Conco Materials Handling Div. • Cranes, Hoists

Represented in Canada by Ontor Limited, 12 Leswyn Road Toronto 10, Ont., Canada

field

HOFFMAN "WATCHMEN"

CENTRIFUGAL TYPE CONDENSATION PUMPS

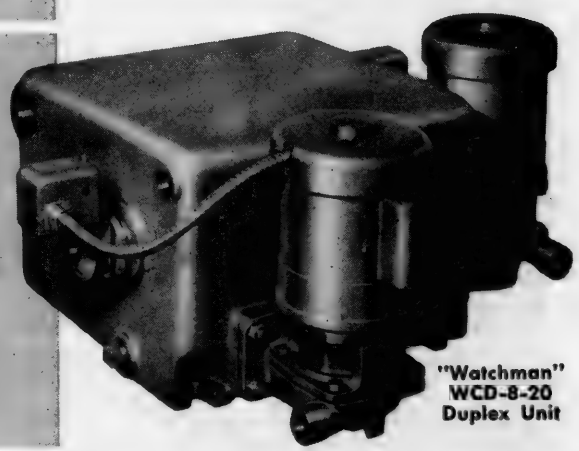
First...

we introduced the "Watchman" WC-8-20 Single Unit Condensation Pump for systems up to 8,000 sq. ft. E.D.R. and 20 lbs. discharge pressure. Receiver capacity: 9 gallons.

"Watchman"
WC-8-20 Single Unit

Next...

we offered the "Watchman" WCD-8-20 Duplex Unit Condensation Pump (two motors, two pumps, two float switches) for systems up to 8,000 sq. ft. E.D.R. and 20 lbs. discharge pressure. Receiver capacity: 14 gallons.

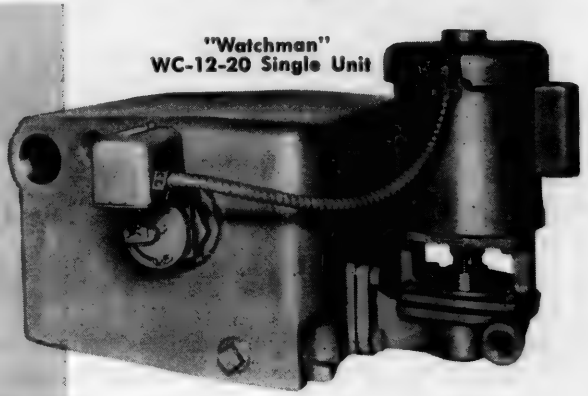


"Watchman"
WCD-8-20
Duplex Unit

and NOW!

we offer the "Watchman" WC-12-20 Single Unit for systems up to 12,000 sq. ft. E.D.R. and 20 lbs. discharge pressure. Pump capacity is 18 gallons per minute. Receiver capacity: 14 gallons.

"Watchman"
WC-12-20 Single Unit



Your Hoffman wholesaler stocks "Watchman" pumps and he also stocks the Hoffman complete line of heating specialties. Call him for latest literature with specifications.

F & T Traps

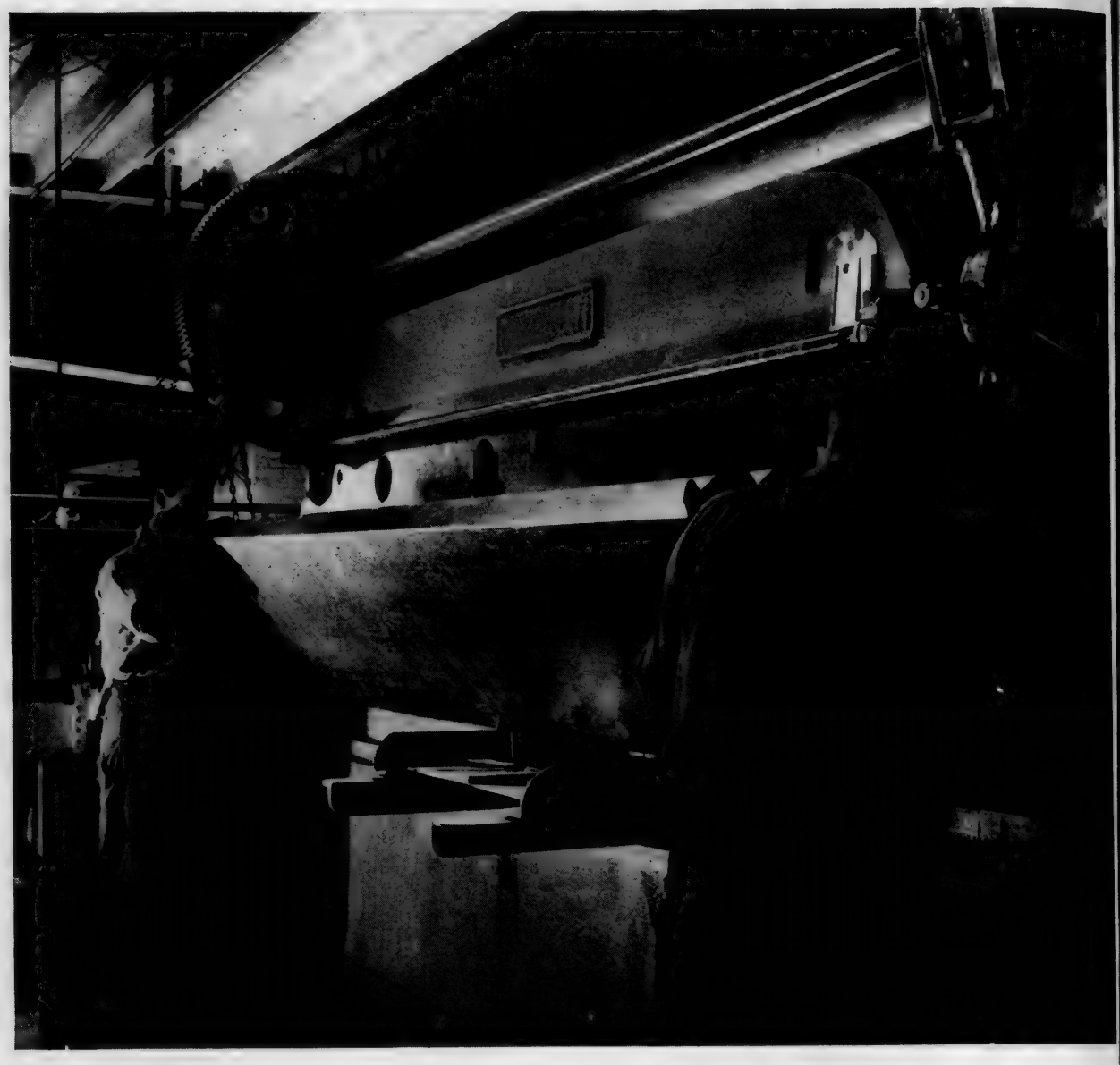
Bucket Traps

"Y" Strainers

Featuring:

- ★ Durable Cast Iron Receivers
- ★ Precisioned one piece bronze impeller
- ★ Efficient bronze fitted centrifugal pump with stainless steel shaft
- ★ Heavy duty double pole float switch
- ★ Quiet, ⅓ H.P., 3450 R.P.M. Motors
- ★ Packed type stuffing box

HOFFMAN SPECIALTY MFG. CORP.
1700 W. 10TH STREET, INDIANAPOLIS 7, INDIANA



Bethcon means better shopwork, better finished product

Bethcon is the galvanized sheet product of Bethlehem's continuous process. As the steel coil moves through the line, it receives a continuous annealing treatment which gives the sheet a desirable combination of strength and ductility that ordinary galvanized sheets just don't have. This means easy workability for sheet-metal men, yet a strong end-product for the customer.

Continuous galvanizing also applies the zinc coating to the steel so tightly that even the toughest forming operations will not crack or otherwise damage the coating. The coating is uniformly distributed over the sheet, and there is no heavy bead on the drip end, as there is with conventionally galvanized sheets.

You can order Bethcon sheets in cut lengths or coils, 13-gage and lighter, with either plain open-hearth or copper-bearing (Beth-Cu-Loy) steel for the base metal, depending on your requirements. If you would like further information or advice about Bethcon, just call or drop a line to the nearest Bethlehem sales office.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

THE SECRET...

The secret of Ilg Type BC Centrifugal Fans is backward-curved airfoil blades . . . blades that move more air with less noise. Air flows smoothly over these streamlined surfaces—eliminates shock loss. Higher efficiency results—allows you to specify a smaller, more compact Type BC unit. Heavy-duty, all-aluminum construction that meets NAFM Class I, II, and III duty requirements up to 9" static pressure without change or modification is standard on all models.

AMCA seal certifies that ratings are in accord with approved codes. Direct connected drive with Ilg motors provides many money-saving advantages. Belted fans also available.

The Man from Ilg can help you plan for efficient ventilation at lowest final cost. Talk your ventilation problems over with him.

ILG ELECTRIC VENTILATING CO.
2851 N. Pulaski Road, Chicago 41, Illinois • Offices in 56 Principal Cities

Send for new catalog on Ilg Type BC Airfoil Centrifugal Fans.
Fully describes advantages and exclusive design features. 32 pages of engineering data and ordering information. Ask for Catalog 257.

Since the Gaslight Era...C

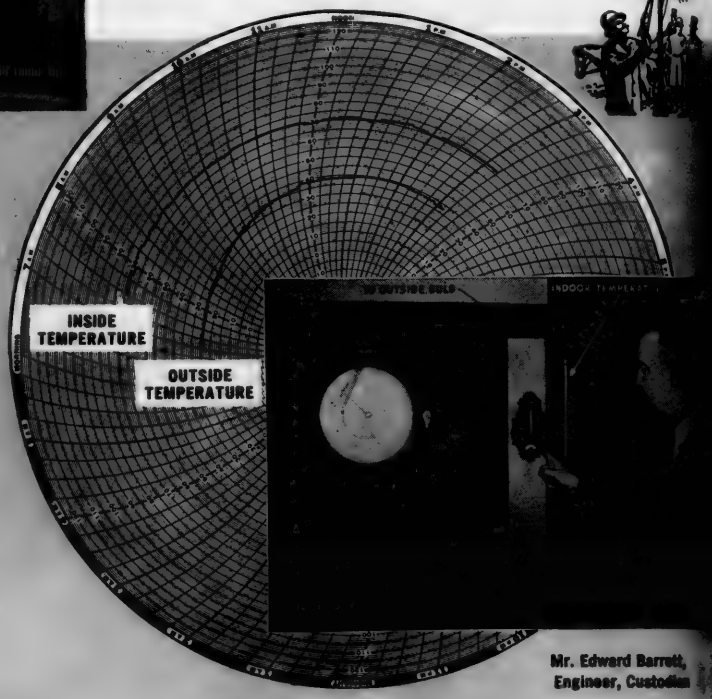
56 Year Old Powers Control System still gives dependable performance shown on temperature charts below

POWERS Type-IC Pneumatic Thermostat

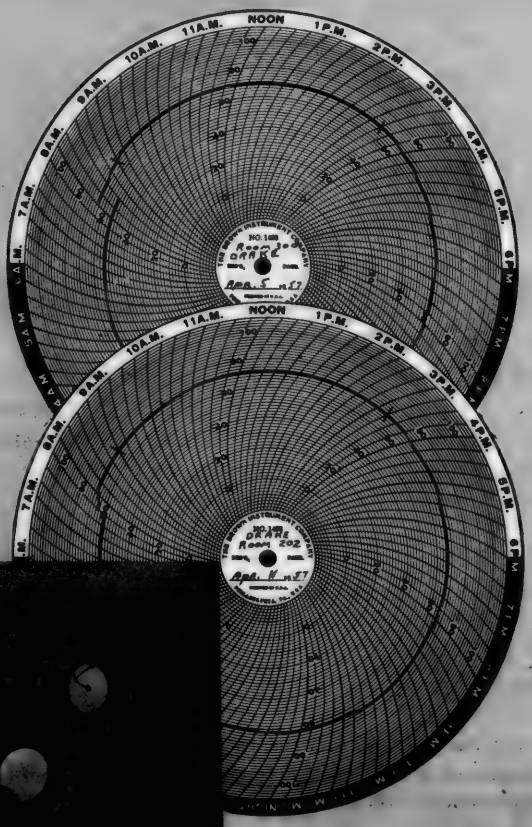
in 1901 The old DRAKE SCHOOL, built at the turn of the century, was one of Chicago's best. It is located in the famed Prairie Avenue district and was completed in January 1901. Temperature of the forced warm air heating and ventilating was regulated by a

POWERS gradual acting Pneumatic Control System

Like earlier Powers systems installed in Chicago's schools, in 1895-96, the thermostats in each room were unique. Their Gradual action in controlling the mixing dampers that supplied tempered air to each classroom was a decided improvement over positive-on-off type of control widely used at that time.



Mr. Edward Barrett, Engineer, Custodian



Mr. George Casey, Engineer-Custodian.

in 1950 On its 49th Birthday recording thermometer charts like the one above showed the good control obtained with this old Powers system.

in 1957 On its 56th Birthday—still not acting its age—Powers control produced temperature recording charts like those at the left. All charts on this page were made in rooms regulated by Powers Type IC Pneumatic Thermostats.

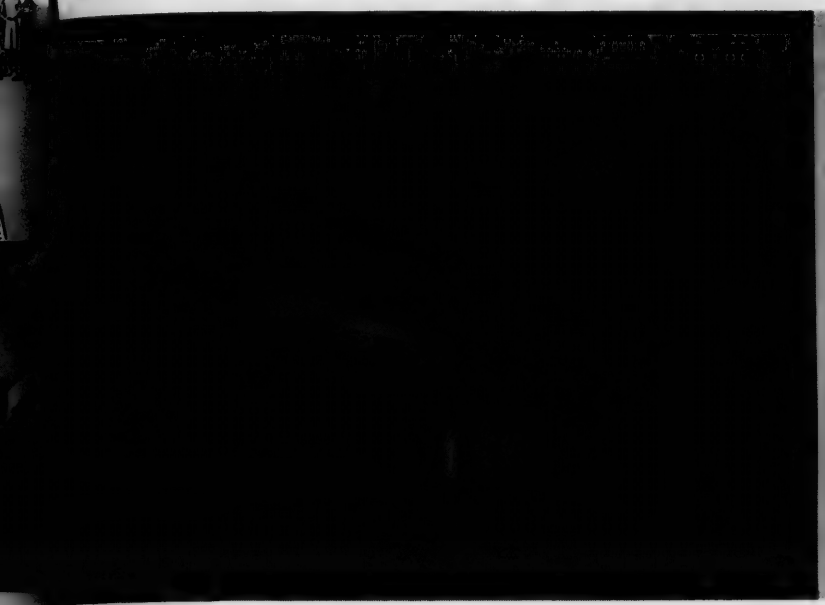
Will the Temperature Control Systems You are Specifying or Buying Today give better, or as good control as this 25 to 50 years from now? Users of Powers control report such performance with low cost for upkeep.

Taxpayers get their money's worth. The charts show No Fuel is Wasted due to OVER-heating. Dependable Powers Control combined with the maintenance program of the Chicago School system team up to provide greater classroom comfort, fuel economy and performance records like the one cited above.

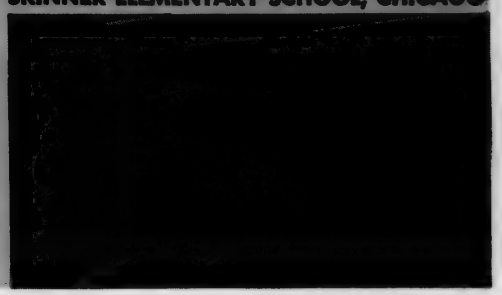
- Only two of many Chicago schools controlled by Powers are illustrated here.

...Chicago Taxpayers benefited from the Economy of

POWERS quality systems of Pneumatic TEMPERATURE CONTROL



SKINNER ELEMENTARY SCHOOL, CHICAGO



Benjamin C. Willis
General Supt. of Schools

Edwin A. Lederer
Associate Supt.
In Charge of Operation Services

John C. Christensen
Asst. Supt. in Charge of Architecture

Schmidt, Garden & Erikson
Associated Architects on Skinner School

Thomas J. Brett
Asst. Supt. in Charge of Plant Engineering

The NEW and FORWARD LOOK in Chicago Schools is exemplified by the new colorful Skinner School

A Favorable Environment for Learning. Located in a drab old neighborhood the pleasing use of colored glazed brick and other materials for exterior and interior, plus many contemporary features, helps teachers operate at peak efficiency and aids pupils desire for learning.

In This Well Designed 35 Room School are 26 classrooms, two kindergartens, library, lunch room, home economics, clinic and adjustment rooms, gymnasium and offices.

Powers Control Provides Thermal Comfort and Fuel Economy. Thermostat in each room regulates reheat coil in ventilating duct. Forced hot water heating in concealed finned radiation is controlled by a Powers MASTROL system.

Are you Planning a New Building? Ask your architect or engineer to include a Powers Quality system of pneumatic control. You'll help insure utmost comfort, fuel economy and lowest cost for upkeep.

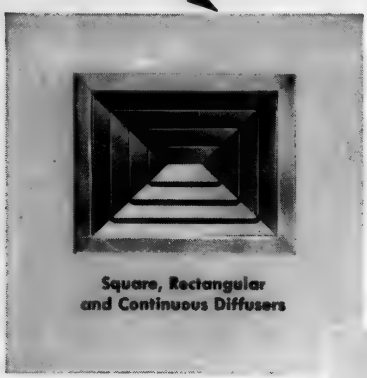
(C40)

THE POWERS REGULATOR COMPANY

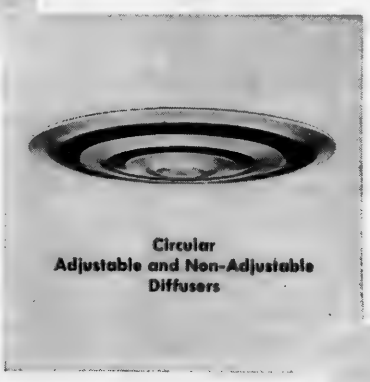
SKOKIE, ILLINOIS | *Offices in Chief Cities in U.S.A., Canada and Mexico*
See your phone book

Over 65 Years of Automatic Temperature and Humidity Control

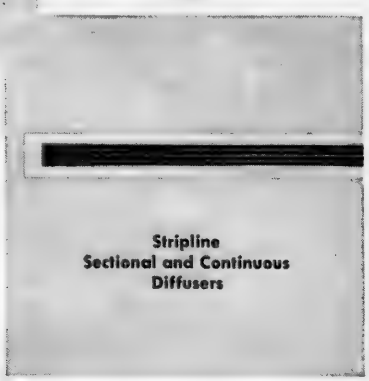
for
any
job
condition... it's AGITAIR® for better air



Square, Rectangular
and Continuous Diffusers



Circular
Adjustable and Non-Adjustable
Diffusers



Stripline
Sectional and Continuous
Diffusers

Choose the AGITAIR that best suits your needs — and feel secure that whichever you choose is outstanding for quality, design, service and dependability. AGITAIR is recognized as a pioneer in the development and manufacture of air diffusers... with more years of air diffuser "Know How" than any other manufacturer. Look around — you'll see AGITAIR everywhere... coast-to-coast... and throughout the world.

THERMOTANK AGITAIR®

high velocity units • punkah louvers
air diffusers • filters • exhausters

Sold exclusively by representatives for:

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185 MADISON AVENUE, NEW YORK 16, N. Y.

Presenting...

the **HAMMOND**

heavy-duty

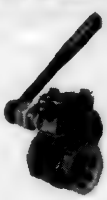
bronze valve line

Now the HAMMOND line includes a broad selection of heavy-duty bronze valves ... produced to the same high quality standards that have made HAMMOND one of the leading manufacturers of specialized plumbing and heating valves. Each HAMMOND heavy-duty valve is fully tested and meets Federal specifications. Backed by HAMMOND's 46 years of experience making bronze valves exclusively. Specify HAMMOND whenever you need a heavy-duty screwed globe, angle or check valve. Write for our condensed catalog No. 146 and comparable valve chart. Hammond Brass Works, Hammond, Indiana.

Some typical HAMMOND high-pressure valves

#413 Composition disc globe with union bonnet and slip-on type disc holder. To 150 lbs. of steam.

#412 Brass disc regrinding globe with union bonnet. To 300 lbs. of steam.



#610 Quick opening gate valve with cam-operated solid wedge disc. To 125 lbs. of steam.

#619 N.R.S. gate valve with solid wedge disc. To 150 lbs. of steam.

Available at your local distributor now

HAMMOND *BRITE-KOTE*® BRONZE VALVES

Know-how makes the

IN HEATER APPLICATION

The new Dravo *Counterflo* has performance built in . . . the kind of performance possible only in a heater in which every part has been designed and built to function as an integrated unit. But it is the skill with which this performance is applied to the solution of a specific heating problem that makes it completely effective.

This is the important "extra" that every Dravo Heater customer gets. *Every* Dravo technical representative *is a qualified heating engineer* skilled at solving all kinds of heating problems in all types of industrial and commercial buildings.

Every man is competent to make a complete heating survey of your installation, working in cooperation with your engineering departments or consultant.

Every man is backed by the home office staff, who can bring both laboratory facilities and the total experience of over 10,000 installations to bear on unusual problems.

Get the benefit of this Dravo "extra" when *you* have a heating problem.

e difference

IN HEATER DESIGN

The new Dravo *Counterflo* heater, developed by an exhaustive research program, represents an important advance in warm air space heating. Its "unitized" design, making each part integrate smoothly with the functioning of the rest, and the fact that each part was designed specifically for its function, makes the new *Counterflo* unique.

DRAVO
CORPORATION

Here are some of the features which make the new *Counterflo* heater your best heating buy:

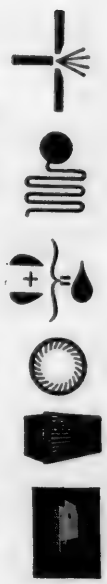
NEW PYROJET BURNER—exclusively Dravo—first burner developed specifically for direct-fired space heaters. Burns low cost oils efficiently. Switches from gas to light oil automatically.

NEW INDUCED DRAFT FIRING—automatically controls fuel/combustion air ratio, high negative pressure in combustion chamber adds extra safety; extra efficiency because of complete control of combustion air.

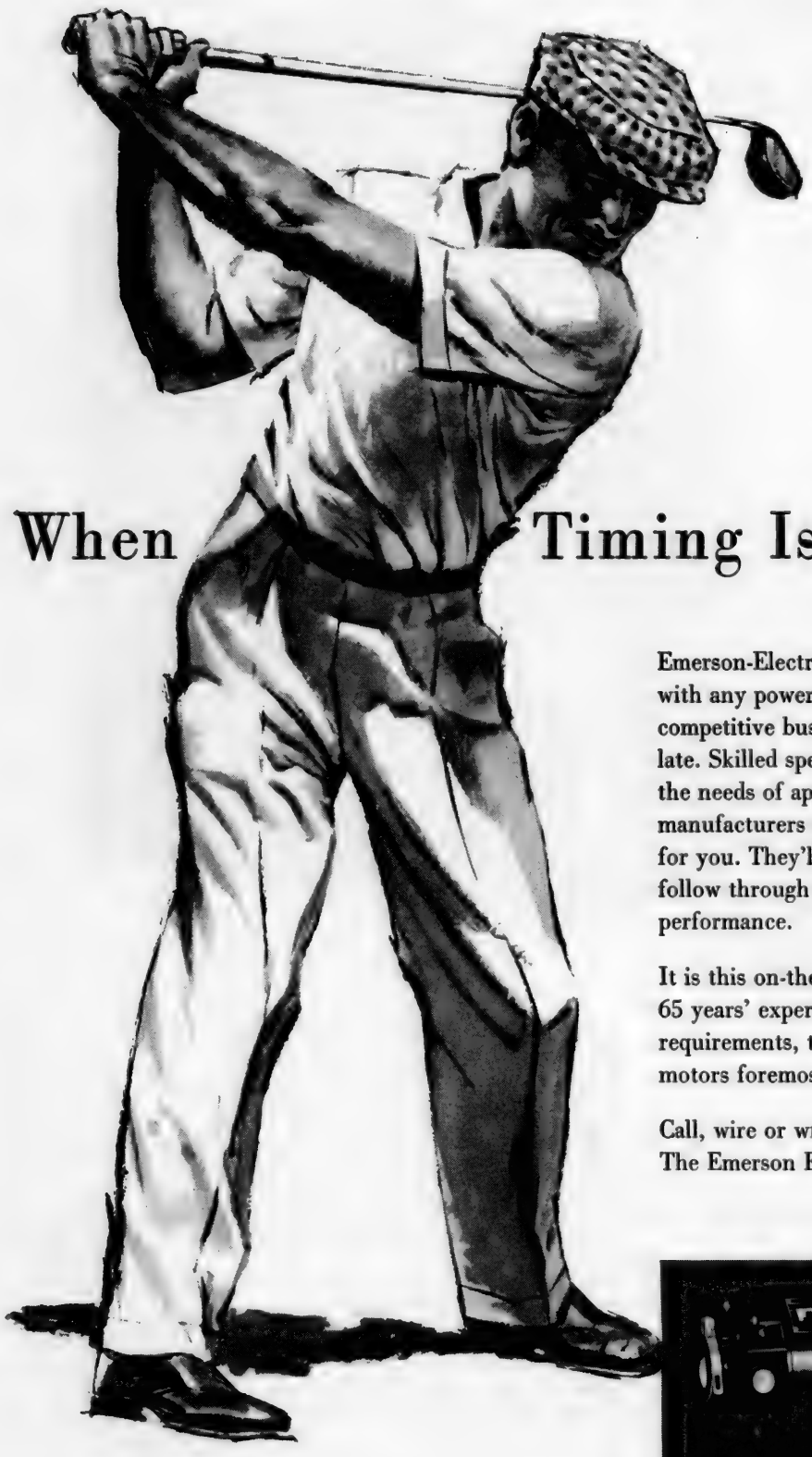
NEW AIRFOIL COMBUSTION CHAMBER—stainless steel, ribbed for extra strength and channeling of airflow—guaranteed for 10 years. Longest possible flame travel for complete combustion within primary heat transfer area.

NEW LOW-SPEED FANS—forwardly curved, low-speed, double inlet fans with high efficiency reduce horsepower requirements in the new Counterflo drastically, operating costs are lower.

NEW DISCHARGE PLENUM—distributes heated air at high velocity without annoying drafts. Adds new flexibility to warm air distribution patterns.



Bulletin 564 describes the many new features of the new Dravo Counterflo heater. Write or phone for your copy today. Address Dravo Corporation, Dravo Building, Pittsburgh 22, Pennsylvania.

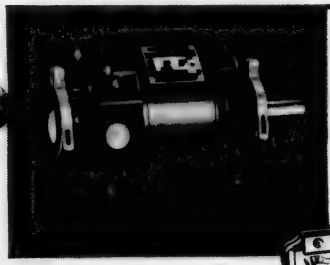


When Timing Is Important

Emerson-Electric is ready to help you *right now* with any power-drive problem. In your highly competitive business, tomorrow can be too late. Skilled specialists who know motors and the needs of appliance and equipment manufacturers are always ready to go to work for you. They'll start with your design ideas—follow through to production and tested performance.

It is this on-the-spot service, plus more than 65 years' experience meeting motor-drive requirements, that have made Emerson-Electric motors foremost in appliance applications.

Call, wire or write Dept. M-102 today.
The Emerson Electric Mfg. Co., St. Louis 21, Mo.



Every Emerson-Electric motor is custom-engineered to meet your exact requirements.

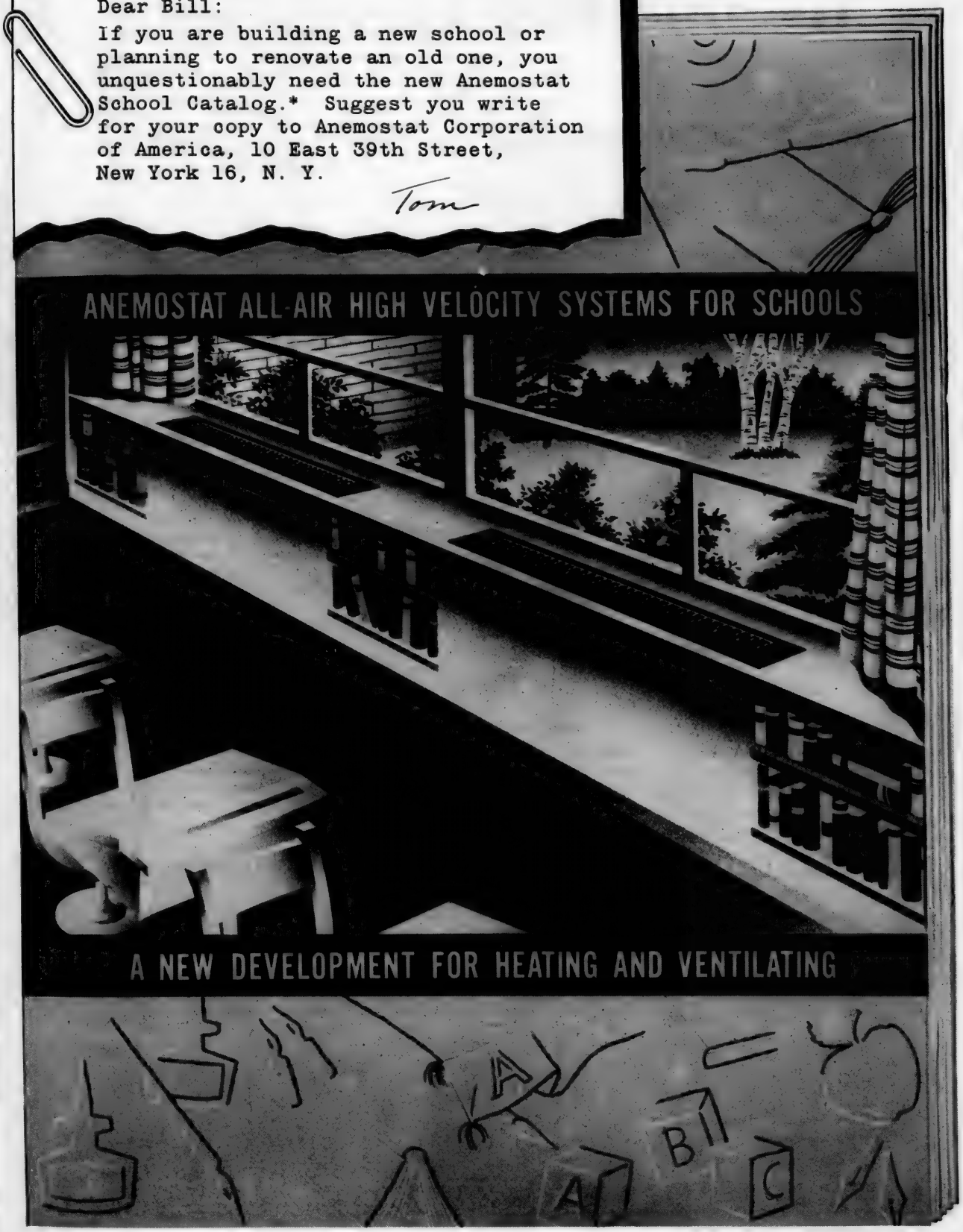
EMERSON-ELECTRIC

of St. Louis *Since 1890*

MEMO:

Dear Bill:
If you are building a new school or planning to renovate an old one, you unquestionably need the new Anemostat School Catalog.* Suggest you write for your copy to Anemostat Corporation of America, 10 East 39th Street, New York 16, N. Y.

Tom

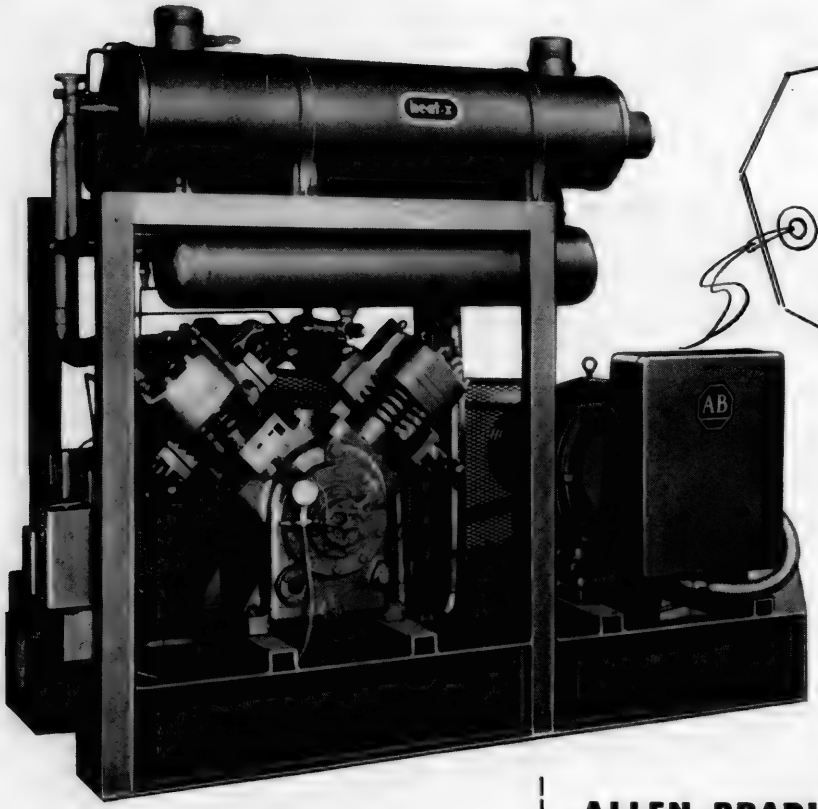


*Contains performance and dimension data, control diagrams, everything you need to specify.

© Anemostat Corporation of America

AG1360

"Your guarantee of trouble free operation"



A-B QUALITY

Heat-X, 50-ton packaged water chiller uses Allen-Bradley Bulletin 736, two-step, part-winding starter, rated 60 hp, 220 v. Bulletin 736 starters are made in ratings to 600 hp, 220 v; 1200 hp, 440-550 v.

Air-conditioning and refrigeration units equipped with Allen-Bradley *quality* motor control are a reliable assurance of years and years of trouble free performance.

The simple design of Allen-Bradley solenoid starters—with only *one* moving part—is virtually foolproof. There are no bearings to corrode and stick . . . no jumpers to break. And the double break, silver alloy contacts are always in perfect operating condition—and *remain* so without servicing.

Specify Allen-Bradley—the motor control you can rely upon for trouble free operation. Write for Handy Catalog.

Allen-Bradley Co.
1330 S. Second St., Milwaukee 4, Wis.
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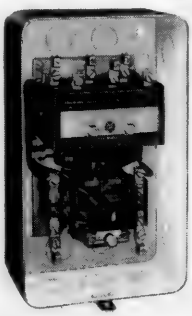
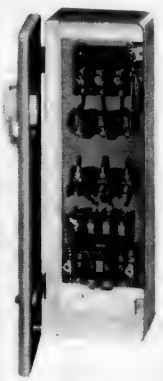
ALLEN-BRADLEY
MOTOR CONTROL
QUALITY

ALLEN-BRADLEY QUALITY CONTROLS

FOR AIR CONDITIONING AND REFRIGERATION



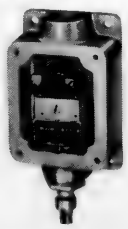
Bulletin 709 across-the-line solenoid starter. 8 Sizes. Max ratings: 300 hp, 220 v; 600 hp, 440-550 v.



Bulletin 712 combination starter. Visible contact disconnect switch. Max ratings: 100 hp, 220 v; 200 hp, 550 v. Also available with ITE breakers for disconnect. See Bulletin 713.

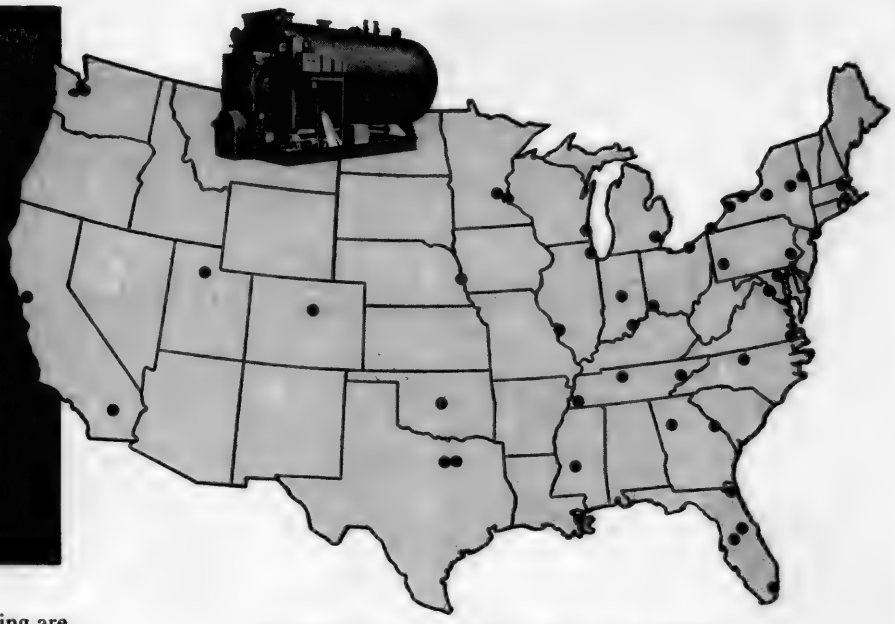
Bulletin 849 pneumatic timer. Time is adjustable from 1/6 to 180 sec. Many styles.

Bulletin 800, two-in-one, selector switch. Quick change for 2- or 3-position operation. Also available with pilot light.



Bulletin 836 pressure control in NEMA Type 4 watertight and weatherproof enclosure.

Continental Boiler Service Coast to Coast



The basic fundamentals of learning are the ABC's. Therefore, when your subject is boiler service — Continental Boiler Service — we believe it essential that you become familiar with the ABC's of Continental Service from coast to coast as follows:

A . . . Aid and Supervision in Start Up.

B . . . Boiler Operating Instruction to Attendants.

C . . . Competent and Dependable Service, if Needed.

As you can see, in its basic and practical application, SERVICE means more than just a willingness to help you before the sale.

That is why so many heating and power plant engineers prefer the Continental Automatic Boiler. For the Continental field organization is built around experienced boiler sales and service personnel. These men have a real stake in your complete satisfaction.

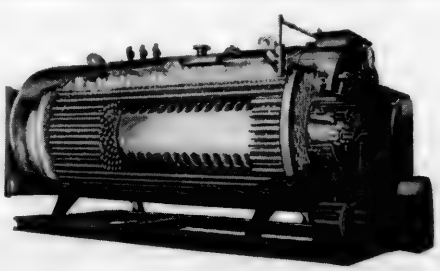
See list at right for the capable, service-minded Continental Boiler representative near you.

Distributors of Continental Boilers

CALIFORNIA
El Cerrito—American Engineering & Mfg. Corp.
Palm Springs—Pacific Engineering Equipment Co.
COLORADO
Englewood—Champion Specialty Co.
FLORIDA
Jacksonville—H. L. McMurry & Co.
Miami—H. L. McMurry & Co.
Orlando—H. L. McMurry & Co.
Tampa—H. L. McMurry & Co.
GEORGIA
Atlanta—Atlanta Distributing Co.
Atlanta—Mechanical Associates
Augusta—Tarte Boiler Repair Co.
ILLINOIS
Chicago—Automatic Steam Sales Co.
INDIANA
Indianapolis—Plibrico Sales & Service Co.
New Albany—Falls Cities Boiler & Machine
LOUISIANA
New Orleans—Cressy Sales Company
MARYLAND
Baltimore—Heating Services, Inc.
MASSACHUSETTS
Dorchester—Lewis National Corp.
MICHIGAN
Dearborn—Kramer & Associates, Inc.
MINNESOTA
Minneapolis—Oil Burner Service Co., Inc.
St. Paul—Lincoln Equipment Company
MISSISSIPPI
Jackson—Climate Engineers, Inc.
MISSOURI
St. Louis—Continental Boiler & Sheet Iron Works
NEBRASKA
Omaha—Midwest Utility Service Co., Inc.
NEW YORK
Buffalo—W. J. Clark Equipment Co.
Gloversville—Olin T. Caldwell & Co.
Hudson Falls—Boiler Equipment Co.
New York—Thermal International, Inc.
Rochester—Ernest J. Rookey
Syracuse—U & S Supply Corp.
NORTH CAROLINA
Greensboro—M. G. Newell Co., Inc.
OHIO
Cincinnati—Kenneth B. Little Co.
Cleveland—M. G. Limbach Company
OKLAHOMA
Oklahoma City—Mecha-Line Co.
PENNSYLVANIA
Erie—Belco Supplies
Phoenixville—Besco Sales, Merrill A. Squier
Pittsburgh—John C. Gregg Company
RHODE ISLAND
Providence—Weatherall Engineers, Inc.
TENNESSEE
Knoxville—Boiler Supply Co.
Memphis—Middle States Associates, Inc.
Nashville—Boiler Supply Company
TEXAS
Dallas—Rodgers Engineering Co., Inc.
Fort Worth—J. P. Philibert
UTAH
Salt Lake City—Power Engineering Company
VIRGINIA
Arlington—Charles C. Plummer
Suffolk—C. Fred Bailey
WASHINGTON
Seattle—International Sales Corp.
WISCONSIN
Milwaukee—Industrial Steam, Inc.

BOILER ENGINEERING & SUPPLY COMPANY, INC.
7 Manavon Street, Phoenixville, Pa.

The Continental AUTOMATIC BOILER

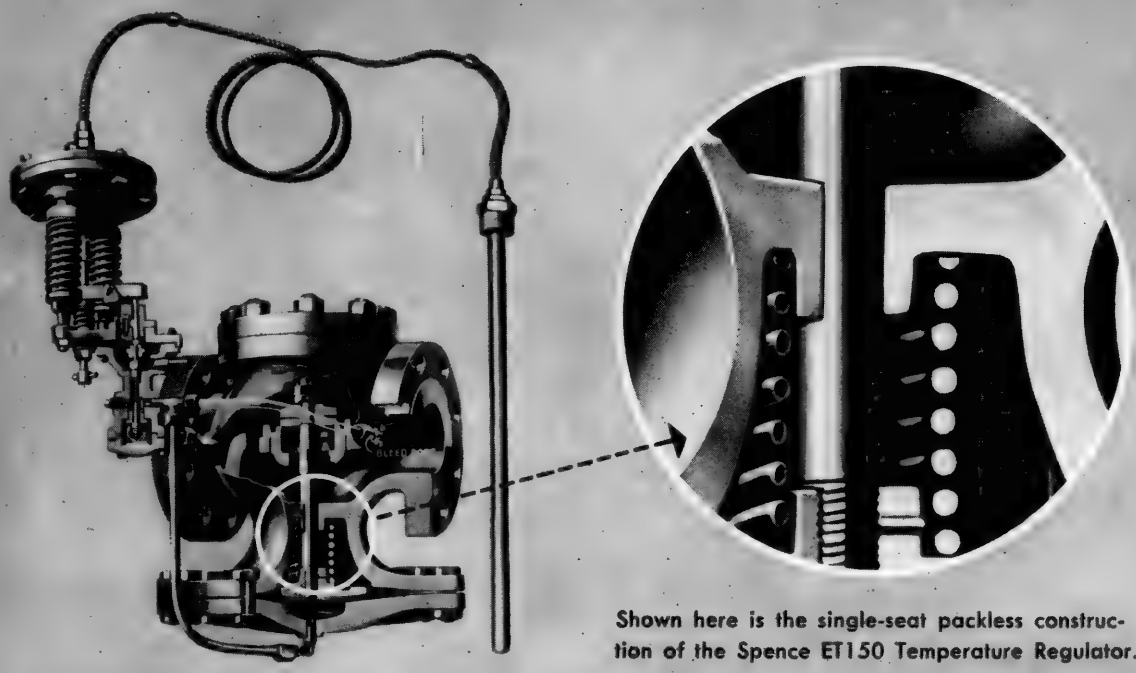


Cut-away view of typical Series A Continental Automatic Boiler, firing oil and/or gas. Other models from 20 to 500 hp, with on-off, low-high-low or modulating controls. For steam heating or process work at pressures from 15 to 250 pounds, or for hot water heating at low or high temperatures.

A HALF CENTURY OF BOILER MANUFACTURING EXPERIENCE

VALVE TIPS:

Advantages of Packless Construction in Temperature Regulating Valves



Shown here is the single-seat packless construction of the Spence ET150 Temperature Regulator.

One of the biggest headaches in regulating valve maintenance is repacking stuffing boxes.

How often a valve needs repacking, how much time it takes, and the cost of the system downtime all vary with the construction of the regulator and the service it's used for. No matter how you calculate all these variables it's still a headache—and an expensive one.

In the temperature regulator shown above (Spence Type ET150) stuffing boxes are eliminated. This is done by what is known as "balanced" diaphragm construction. You can see in the cutaway drawing that pressure is applied to both sides of the large metal diaphragm. The upper side is exposed to delivery steam pressure and the lower side is exposed to loading pressure applied by the pilot. When the pilot closes, both delivery pressure and loading pressure are equalized through the bleedport and connecting tubing.

This construction not only does away with repacking problems, but it makes possible additional savings as well. For example, you will note in the sectional blow-up that this design eliminates a closely fitted stem and guide. Dirt or other foreign matter doesn't have much of a chance to lodge between these parts and cause sticking.

Another cause of binding or sticking, uneven expansion of closely fitted parts, is also eliminated with this design. In addition, valve stem wear is reduced for the same reason.

Lower maintenance is not the only advantage of this packless construction. Accuracy of regulation is also improved because friction due to a stuffing box, dirt, or uneven expansion is not a problem. The large, balanced metal diaphragm is more sensitive to slight changes in pressure.

Guaranteed Not To Wiredraw

If seats and discs are cut by steam (wiredrawn) the loss of steam through these grooves can be another expensive item — directly charged against the regulating valve. Fortunately, you can eliminate these costly leaks by specifying a temperature regulator that is *guaranteed not to wiredraw.*

Spence makes such a guarantee because their seats and discs are made of SECO Metal. Over 20 years experience with this special alloy has failed to produce a single case where a SECO Metal seat or disc had been cut by steam. All that's required is an approved strainer located ahead of the regulating valve. Expensive steam leaks just can't happen with this combination of SECO Metal and single-seat design.

If you would like to have more information on Spence Temperature Regulators, drop us a line and ask for Bulletin T150. It gives more detailed information on these and other Spence design features. Piping layouts and helpful information on the installation of temperature regulators are also included. Write for your copy today.

SPENCE ENGINEERING COMPANY, INC.
Walden, New York

SE 140

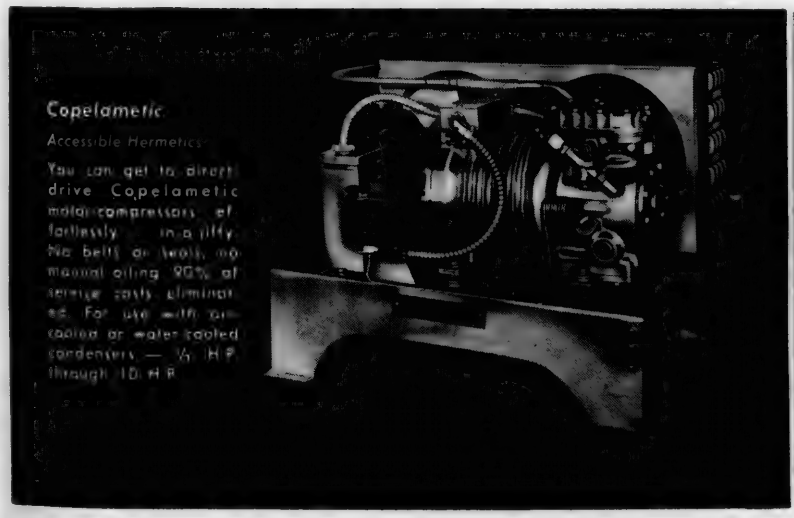
LONG LIFE.. and still going strong!

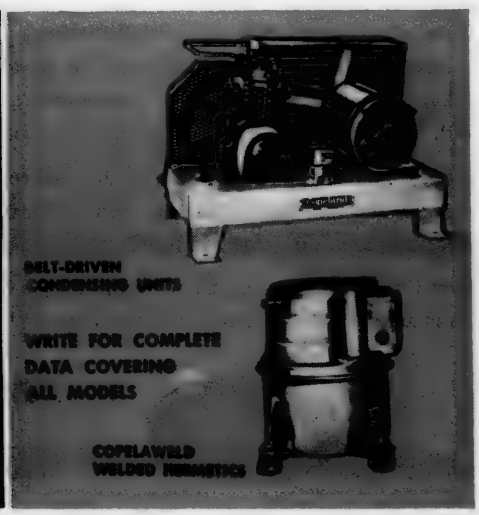
Darling may be growing older, with silver threads among the gold, but many an ancient couple is still doing a powerful lot of day-to-day living.

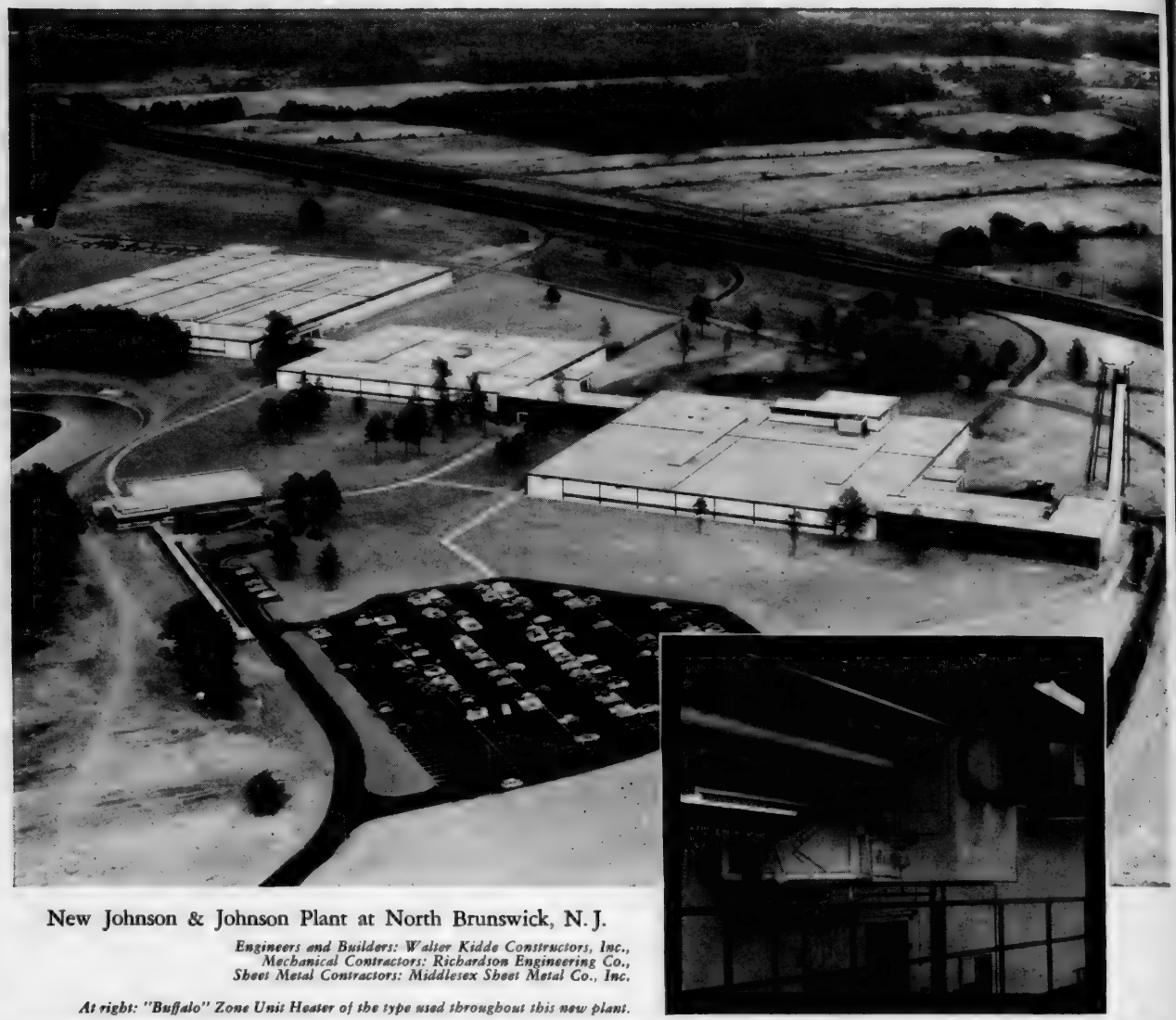
And Copelametic units installed nearly 20 years ago are today giving new-compressor performance. That's because they're engineered and built for trouble-free service over a long period of time. There are no belts, seals or manual oiling to run up servicing time.

Name the kind of air conditioning and refrigeration installation you're interested in, and we'll provide precisely the Copelametic model to make it give complete customer satisfaction.

SINCE 1918 **Copeland** REFRIGERATION CORPORATION, Sidney, Ohio







New Johnson & Johnson Plant at North Brunswick, N. J.

Engineers and Builders: Walter Kidde Constructors, Inc., Mechanical Contractors: Richardson Engineering Co., Sheet Metal Contractors: Middlesex Sheet Metal Co., Inc.

At right: "Buffalo" Zone Unit Heater of the type used throughout this new plant.

WORLD'S NEWEST AND LARGEST SURGICAL DRESSINGS PLANT UTILIZES OVER 150 "BUFFALO" AIR HANDLING UNITS

Johnson & Johnson's ultra-modern Eastern Surgical Dressings Plant features many miracles of the automation age... ranging from a mile-and-a-half-long electronically-controlled automatic conveyor system to 23 four-way push button operated loading docks. Pre-planned plant expansion permits enlargement of the three major buildings in six directions without disturbing present production operations.

In such a modern plant, as carefully planned for tomorrow's expansion needs as for today's efficiency standards, it is natural to find "Buffalo" Air Handling Equipment.

Over 150 "Buffalo" Heaters, Central System Air Conditioning Units and Ventilating Fans provide all atmospheric control. In addition to heating and ventilating requirements, this includes air conditioning in all offices, the cafeteria and sections of the manufacturing area where the conditions demand its use.

Over 81 years of engineering experience, plus modern-as-tomorrow design, insure the efficiency and economy of every "Buffalo" installation. Whatever your air conditioning, heating, ventilating or air cleaning problem, contact your nearest "Buffalo" representative, or write us direct for full information.

Engineered into *every* "Buffalo" product is the "Q" Factor — the built-in Quality which provides trouble-free satisfaction and long life.

"Buffalo"

BUFFALO FORGE COMPANY

BUFFALO, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

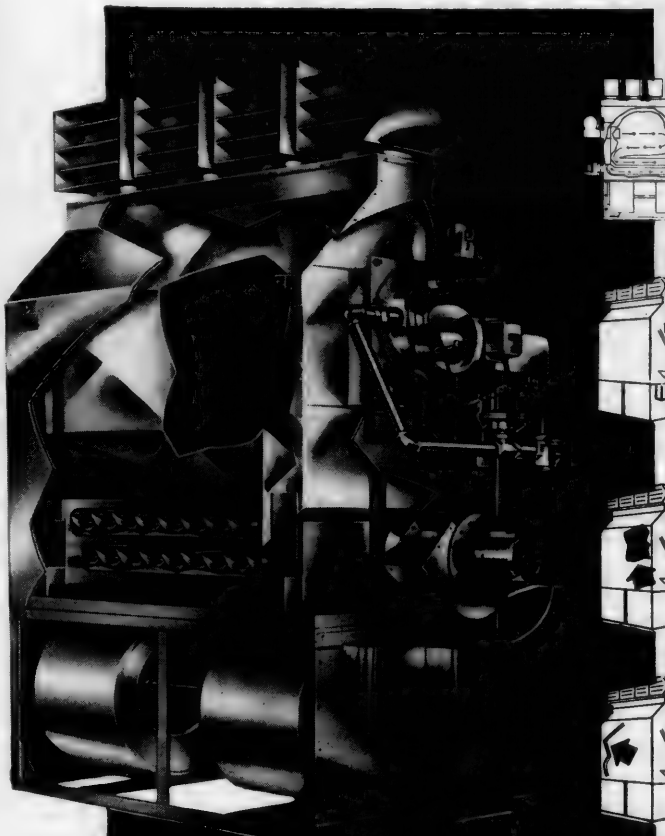
VENTILATING AIR CLEANING AIR TEMPERING INDUCED DRAFT EXHAUSTING FORCED DRAFT COOLING HEATING PRESSURE BLOWING

From the World Leader in Warm Air Heating . . .

LENNOX industrial heaters

For Space Heating, Drying, Make-Up Air, Oven Applications · 400,000 to 2,000,000 Btuh

brings you



1 4-PASS COUNTER FLOW DESIGN...

Gets Most Heat from the Flame!

See how flame and combustion gases travel length of the heat exchanger *four times*. Result: highest possible efficiency! With this principle, no directional baffles are needed; *design* does the job. An important, trouble-free LENNOX exclusive!

2 MASTER CONTROL SYSTEM...

Factory Wired! Trouble Free!

Control based on newest-type lead sulfide scanning device—for Greater Safety, Longer Life! One master control provides all sequencing, eliminates non-standard controls. Automatic protection for any failure. No cold-surge at startup; blowers operate only at proper bonnet temperature.

3 STAINLESS STEEL COMBUSTION CHAMBER...

With 10-Year Warranty!

Rugged steel construction and free-floating design eliminate failures due to unrelieved stress. Operating temperature utilizes only 70% of steel's oxidizing temperature. *Maximum flame radiation* with 80% of total heat output transmitted in primary area.

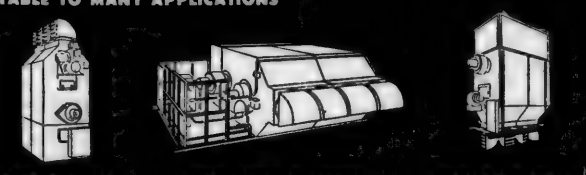
4 DOUBLE CASING; METAL RADIATION SHIELD...

Another LENNOX Exclusive!

This added protection holds casing heat loss to absolute minimum. Special air-tight locking seams eliminate cabinet air leaks. The outer cabinet is further protected by enamel coat that resists heat and corrosion. One more reason why a LENNOX heater lasts longer!

Mail Coupon **FOR COMPLETE ENGINEERING DATA!**

ADAPTABLE TO MANY APPLICATIONS



FLOOR UNITS HORIZONTAL UNITS INVERTED UNITS

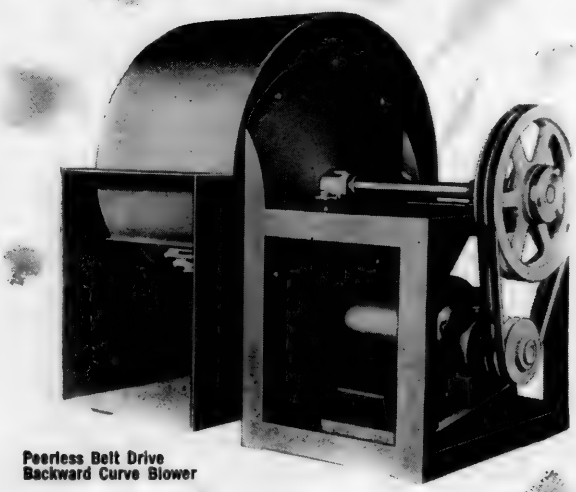
LENNOX INDUSTRIES, INC.
INDUSTRIAL DIVISION, Dept. A-2
1701 East Euclid, Des Moines, Iowa
Please rush me complete data on Lennox AT Series Industrial Heaters.

Name_____

Title_____ Company_____

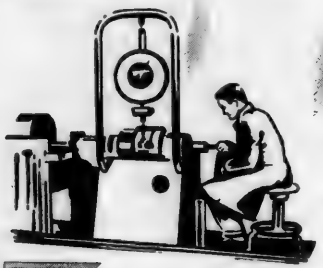
Address_____

City_____ State_____



Peerless Belt Drive
Backward Curve Blower

Peerless Belt Drive
Centrifugal Roof Ventilator



TESTED... AND RATED TO AMCA* SPECIFICATIONS

*The new Air Moving and Conditioning Association formed by merging PFMA, NAFM and IUHA.

As a charter member of AMCA, we are naturally vitally interested in listing and rating our air moving products according to AMCA specifications as set forth in the AMCA code. The products you see here are the two most important, basic products in our expanded line of air moving equipment. Along with other Peerless air moving units, they have been designed and manufactured to meet all AMCA standards. With this assurance, Peerless air moving equipment can be specified and installed with confidence. When you have an air moving condition which needs solving, call your nearby Peerless representative or the Peerless factory direct. We can all work together in helping you arrive at the best possible solution.

Write today for Bulletins SDA-160, SDA-200 and SDA-220!

A COMPLETE LINE OF AIR MOVING EQUIPMENT

Charter Member of the Air Moving and Conditioning Association, Inc. (AMCA)

Peerless Electric

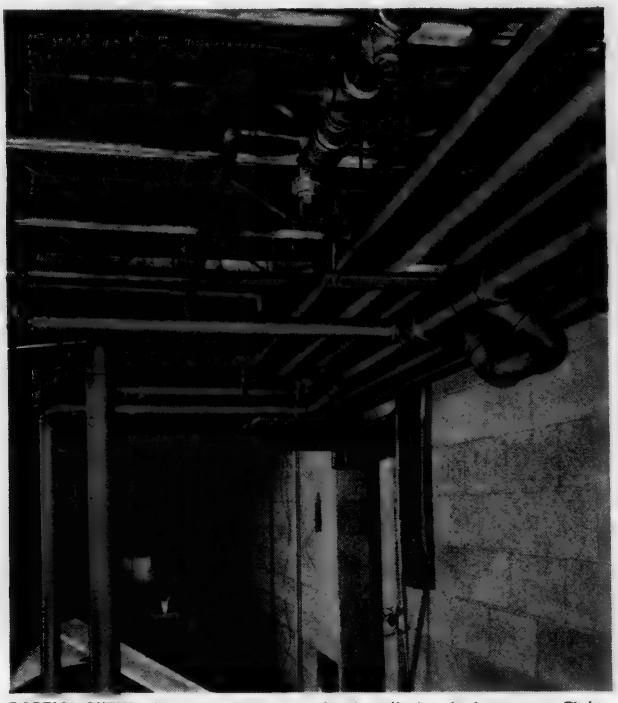
FAN AND BLOWER DIVISION
THE Peerless Electric® COMPANY
1400 W. MARKET ST. • WARREN, OHIO
FANS • BLOWERS • ELECTRIC MOTORS

SEE OUR CATALOG IN SWEET'S

COPPER

simplifies plumbing in new South Bend hospital

WATER PIPING and sanitary drainage lines of copper tube between floor and ceiling. The light weight of copper tube makes overhead work like this easier and faster. Copper tube with cast-brass solder-joint fittings was used throughout the 5-story building for the sanitary drainage system.



PARTIAL VIEW of compact copper tube installation in basement. Tight working space presents no problem with copper tube and solder-joint fittings. *Architect: John N. Marx, Chicago. General Contractor: Cornelius Pitt and Company, Chicago and South Bend. Mechanical Contractor: Allied Plumbing & Heating Co., South Bend.*

A TOTAL of 7000 feet of Anaconda Copper Drainage Tube, Type DWV, in sizes from 1¼" to 6", was used in the sanitary drainage system of the new South Bend, Indiana, Osteopathic Hospital. In addition, 25,000 feet of Anaconda Type L copper tube, in sizes from ½" to 4", was used for the hot and cold water supply lines.

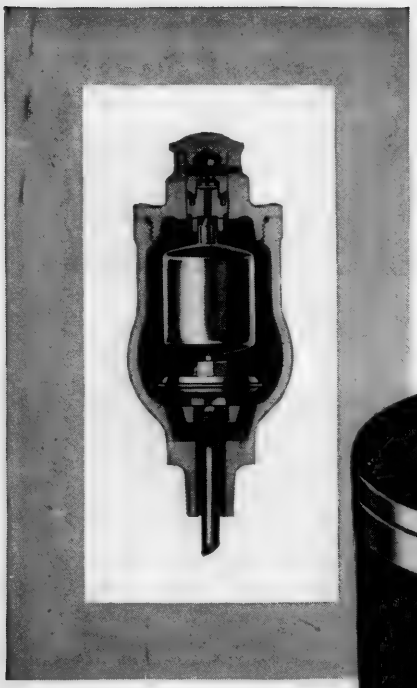
In commenting on the use of copper tube for the sanitary drainage system, Mr. Cornelius Pitt, President of Cornelius Pitt and Company, general contractor, said, "It just doesn't make sense to use copper plumbing for the water supply lines and another material for the piping of the drainage system.

"The light weight and long standard lengths of copper tube, and the compact, solder-joint fittings make it much easier and faster to install. This is particularly an important economy factor in roughing-in the larger sizes required for the sanitary drainage lines of a multi-story commercial or institutional building.

"Everyone concerned with the plumbing in this ultra-modern hospital building—the owners, the plumbing contractor and our firm as general contractors—are satisfied that the claimed advantages of 'ALL COPPER' plumbing are, if anything, very much on the conservative side."

Anaconda Copper Tubes – Types K and L for water supply and heating lines; Type M and the new lighter weight Type DWV for the sanitary drainage system. Anaconda wrought and cast solder-joint fittings in types for pressure and drainage applications are available in a complete range of sizes. Write for Anaconda Publication C-33. Address: The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont. 6758

ANACONDA®
Copper Tubes and Fittings
PRODUCTS OF THE AMERICAN BRASS COMPANY
Available through Plumbing Wholesalers



A well placed air vent can work a heating miracle!

No. 5 Rapid Vent. Float and thermostatic construction. Designed for use at the end of steam mains, tops of risers and other similar locations on vapor and one pipe vacuum systems where the maximum venting requirement does not exceed one cubic foot per minute at 5 psi.

No. 6 Quick Vent. Thermostatic only. Designed for installation at high points in the piping where there is not sufficient room for the No. 5 Vent or where a float is not needed. Same venting capacity as No. 5.

In a Wilmette Illinois Building, an outwardly well-engineered vacuum system had been a headache for years. Then, last winter, along came a heating man who quickly sized up the situation and said with real conviction: "Put a Marsh No. 5 Vent right there!"

That did it! One inexpensive vent cleaned up a spotty, erratic condition, that a number of expensive alterations had failed to touch.

Unusual? Not in the least: over the years we have seen a lot of wonders worked by installing the right kind of Marsh air vent in the right spot. A number of these dependable vents are illustrated here . . . products that express an unrivaled accumulation of knowledge in dealing with air venting problems.

Marsh air vents are fully covered by the Marsh Heating Specialty Catalog along with Marsh Traps and Valves. Your local Marsh man will be glad to work with you in applying Marsh Vents effectively.

No. 50 Air Vent. Float only. Designed to remove air and gases automatically from hot or cold water tanks, coils or piping, liquid pump systems or similar applications where it is necessary to vent air rapidly. Maximum working pressure, 125 psi.

No. 55 Air Vent. Float and thermostatic construction. Is capable of expelling large volumes of air without passage of water or steam and is designed for use on steam pressure vessels or systems. Maximum working pressure, 125 psi.

No. 7 Air Eliminator. Float and thermostatic construction. Especially suitable for installation at the ends of steam mains, return piping and tops of risers where it is necessary to expel a large volume of air from the system. Suitable for working pressures up to 15 psi.

MARSH HEATING EQUIPMENT CO.

Sales Affiliate of Jas. P. Marsh Corporation

Dept. U, Skokie, Ill.

Marsh Instrument & Valve Co. (Canada) Ltd., 8407 103rd Street, Edmonton, Alberta, Canada

MARSH

Quality Heating Specialties since 1865

TEVA* revealed that SNAP*ON pipe insulation would save $10,140!

- **an initial saving of $10,140 on 15,000 ft. of pipe insulating material!**
- **an annual operating saving of $1836!**

. . . these were some of the reasons why one-piece Snap*On glass fiber pipe insulation was recently selected for the process lines of a huge new industrial plant. Method used to compare various insulations was TEVA (Thermo-Economic Value Analysis).* TEVA findings showed that 1½" Snap*On was *thermally more efficient* than 2" of the compared insulation, and thus $10,140 could be saved on material alone. Application savings, based on actual time studies, were estimated at 15%-20%. Operating savings of 3.6 billion Btu/year were calculated to result in an additional annual saving of $1836.

***TEVA (THERMO-ECONOMIC VALUE ANALYSIS) IS AN EXCLUSIVE G-B SERVICE, YOURS FOR THE ASKING. FOR TEVA SERVICE, CALL YOUR LOCAL G-B DISTRIBUTOR (LISTED IN THE YELLOW PAGES IN 66 CITIES)**

GUSTIN-BACON

Manufacturing Company GUSTIN gb BACON

Thermal and acoustical glass fiber insulations • Pipe coupligns and fittings
Molded glass fiber pipe insulation
222 W. 10th St., Kansas City, Mo.

With Youngstown Steel Pipe on the job new **Lamson & Sessions** plant gets dependable, life-time piping system

To keep pace with the growing demand for their complete line of industrial fasteners, Lamson & Sessions Co. are erecting this new, beautiful, highly functional plant on Cleveland's Tiedeman Road. Providing dependability and long life for the plant's all-important piping system will be tons of quality Youngstown Steel Pipe.

For years leading architects, as well as progressive plumbing and heating contractors, have specified Youngstown Steel Pipe because it's been their guarantee of trouble-free water piping systems.

Youngstown Steel Pipe is made of only the finest steel with exacting attention given to all sizing, threading and finishing processes. Close quality control of every step in Youngstown's fully integrated operations—from ore mining to finish threading—produces the best pipe obtainable—anywhere.

Your Youngstown Pipe Distributor is only a phone call away—why not contact him today?

Building Owner:	**Lamson & Sessions Company, Cleveland**
Engineer:	**The George S. Rider Company, Cleveland**
General Contractor:	**The Sam W. Emerson Company, Cleveland**
Plumbing & Heating Contractors:	**The Smith & Oby Co., Cleveland** **The Ed Sweeny Company, Cleveland**
Distributor:	**Grinnell Company, Cleveland**

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Yoloy Steel

General Offices - Youngstown 1, Ohio

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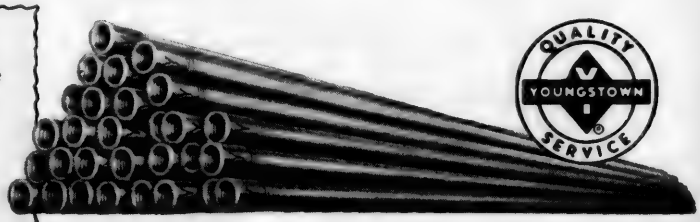
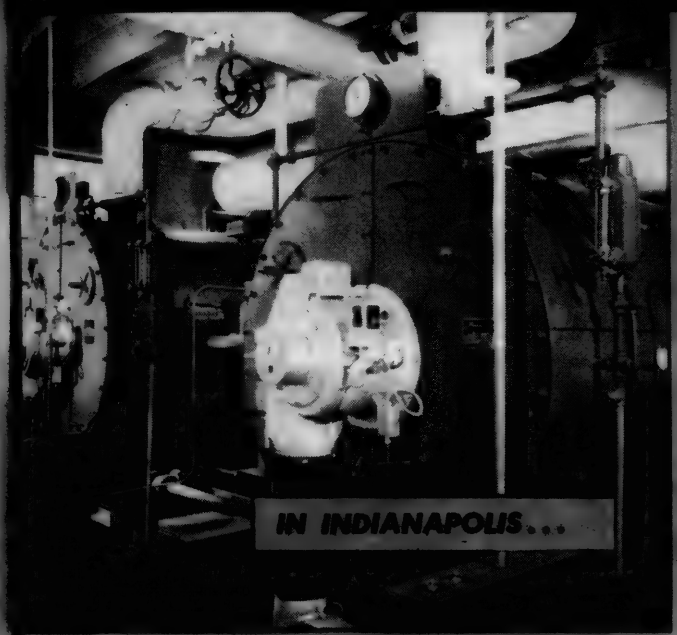
Specify Youngstown and secure these 7 Points of uniform goodness

- uniform ductility
- uniform lengths
- uniform threading
- uniform weldability
- uniform wall thickness and size
- uniform strength and toughness
- uniform roundness and straightness



3 Cadillac Dealers Get the Powermaster® Idea at the Same Time



All 3 sell the same car, the nation's leading "prestige" automobile. All 3 insist on the best all-around product in all their agency operations. All 3 chose *Powermaster* to be certain of the highest efficiency in their new boiler rooms. It's more than coincidence. In Cincinnati, two 70 hp hot water boilers were installed; in Indianapolis, two 100 hp low pressure steam units are needed; in Reading, a 200 hp low pressure steam *Powermaster* filled the bill. But in all cases, the result is the same. New fuel economy and more dependable service are by-products of every installation. For the kind of proof you can readily apply to your own operation, write for Bulletin 1241.

Powermaster®

PACKAGED AUTOMATIC BOILERS
Sizes to 500 hp; pressures to 250 psi

Builders of Dependable Boilers Since 1885

ORR & SEMBOWER, INC.

Morgantown Road, Reading, Pa.

Erected by: The Fulton-DeKalb Hospital Authority, Atlanta, Ga.

Architects and Engineers: Robert and Company Associates, Atlanta, Ga.
General Contractor: Robert E. McKee General Contractor, Inc., Dallas, Texas
Piping Contractor: J. S. Brown-E. F. Olds Plumbing & Heating Corporation, El Paso, Texas
Fire Protection System: Grinnell Company, Inc.

GRADY MEMORIAL HOSPITAL *selects* JENKINS VALVES *for long service life*

Looked at from any angle, Atlanta, Georgia's new $21,000,000 Grady Memorial Hospital—1069 beds, 17 operating rooms—is designed for economy in upkeep as well as efficiency. Like all operating equipment, the valves selected for this modern hospital had to pass a tough "physical".

Hospital authorities and builders had no difficulty agreeing on the specification "JENKINS" for all standard valves in the 21-story building. The extra measure of performance and reliability built into Jenkins Valves for generations assured long operating life, and low maintenance cost.

No other valves have such a long record of efficient, economical service. A good thing to remember when you select valves . . . especially since the valves that bear the famous Jenkins Diamond mark *cost no more.* Jenkins Bros., 100 Park Avenue, New York 17.

Valves on fire protection lines are among thousands of Jenkins Bronze and Iron Valves on duty at Grady Memorial Hospital.

JENKINS

LOOK FOR THE JENKINS DIAMOND

VALVES

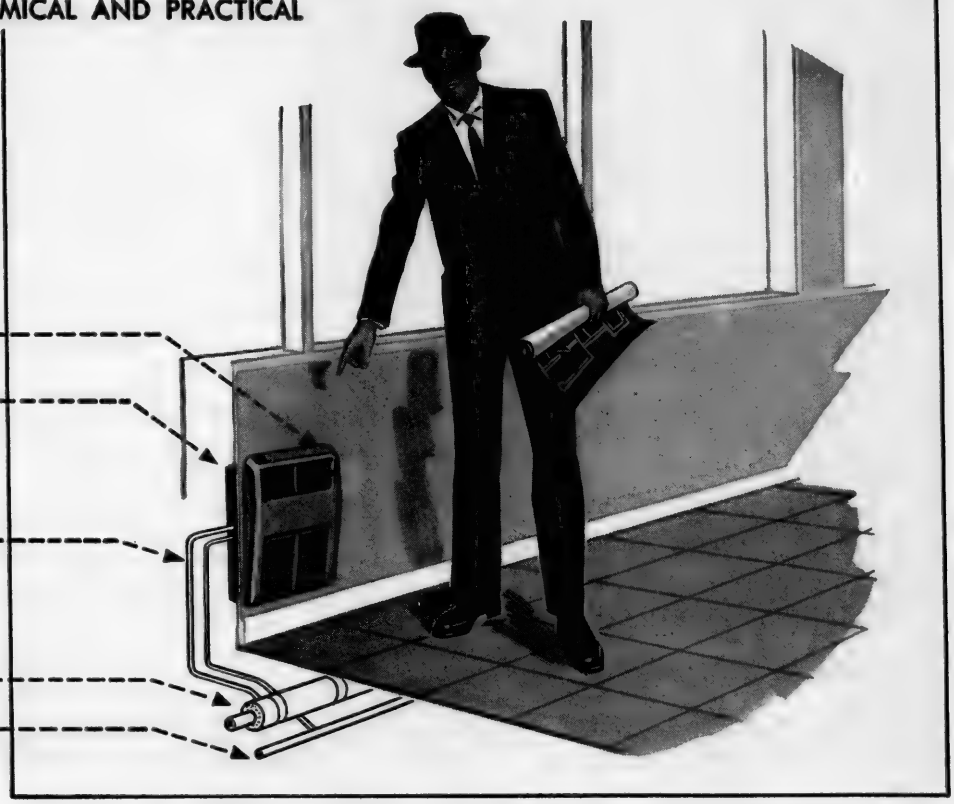
JENKINS SINCE 1864

Jenkins Bros.

Sold Through Leading Distributors Everywhere

ACCURATE ROOM-BY-ROOM TEMPERATURE CONTROL
NOW ECONOMICAL AND PRACTICAL

IRON FIREMAN
SelecTemp®
HEATING


THERMOSTAT
AIR HEATING, FILTERING AND CIRCULATING UNIT
Each room heater is an automatic unit, with steam heating core, air filter, steam driven fan and non-electric thermostat. Recessed in wall, requires no floor space.
COPPER TUBING
Low first cost. Substantial installation savings in new or existing construction. Flexible copper tubing concealed in walls and floors. Uses low pressure steam from boiler or district steam.
STEAM SUPPLY
CONDENSATE RETURN

New answer to old heating problems

The problem of room temperature control. SelecTemp heating is a new application of steam heat in which heat from a central source (low pressure boiler or district steam) is automatically regulated in each individual room. Temperature control is very accurate.

The problem of balanced heat. The warm and cool sides of a building are uniformly heated. A thermostat in each room automatically regulates heat according to room needs, compensating for any exterior or interior heat loss or gain resulting from wind, sun, fireplace, or a varying number of occupants.

The problem of varied temperatures for varied activities. In a school, for example, SelecTemp meets the different needs of classrooms, gymnasium, library or shop.

The problem of space. SelecTemp uses no floor space; compact room units, only 18" high, are recessed into walls. Steam supply and return lines of small copper tubing are concealed in walls and under floors. Extra space is not required for ducts or rigid pipes, permitting unusual design freedom, and in most cases, savings in construction costs.

The problem of modulated heat. Air circulation is steady. Temperature is controlled by regulating the amount of warmth delivered—not by stop-and-go cycling. Temperature is remarkably uniform from floor to ceiling and from corner to corner.

The problem of economy. With all its advantages, SelecTemp costs no more than many conventional systems not providing this unique automatic temperature control of each room. Fuel is saved because unoccupied rooms can be kept cool and reheated in a few minutes. Occupants do not waste heat through open windows. SelecTemp heating is equally suited for use in both new and existing construction.

SELECTEMP ROOM HEATER SPECIFICATIONS

	Model H-6	Model H-12	Model H-18
Output, Btu/hr at 10 PSI	6,000	12,000	18,000
Wall opening	17"x 6¾"	17"x 11"	17"x 15½"
Air Vol. CFM	60	120	180
Room heater supply line from main	⅜" O.D. Copper Tube		
Room heater return line to main	¼" O.D. Copper Tube		
Thermostat Range	40° to 90°		

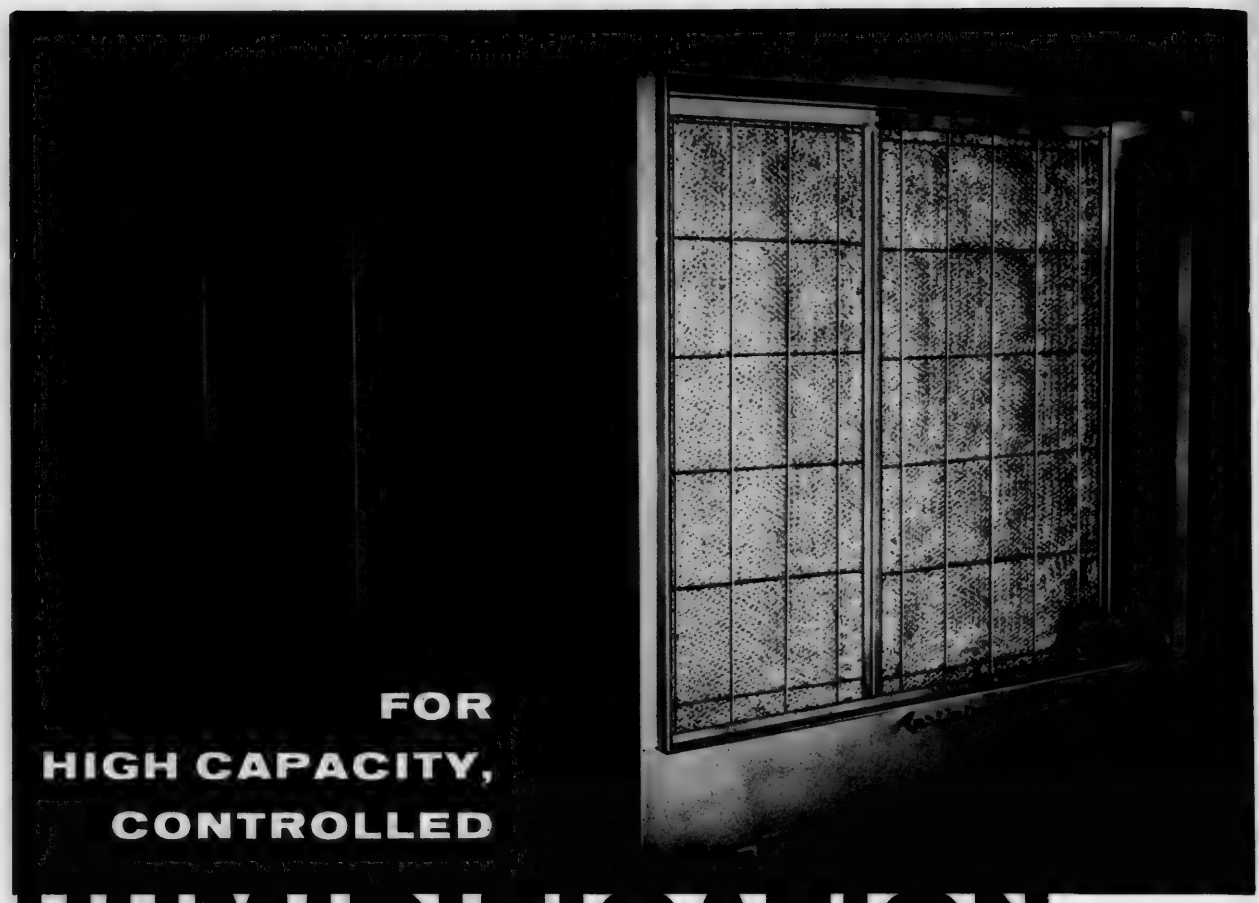
See catalog in Sweet's Architectural and Light Construction Files

IRON FIREMAN®
Engineered HEATING AND COOLING

IRON FIREMAN MANUFACTURING COMPANY
3066 West 106th Street, Cleveland 11, Ohio
(In Canada write 80 Ward Street, Toronto)

☐ Send SelecTemp specifications and full information.
☐ Arrange for brief demonstration of SelecTemp room unit, in actual operation, in our office.

Name.....
Firm.....
Address.....
City.....Zone.....State.....



FOR
HIGH CAPACITY,
CONTROLLED

HUMIDIFICATION

RP **Aprilaire**

AUTOMATIC-ELECTRIC HUMIDIFIERS

HIGH CAPACITY

Aprilaire Industrial Humidifiers (illustrated) are designed to provide capacity for practically any size requirements. Unit sizes up to 10 G.P.H.—can be installed singly or in a series of any number of units.

POSITIVE CONTROL

The Aprilaire introduces relative humidity as needed . . . and only when needed. Automatic control eliminates possibility of lag or over-run.

FLEXIBILITY

Aprilaire industrial models are easily installed packaged units. Available for gas, steam or hot water source, every model can be pedestal-mounted or suspended—according to individual requirements.

BACTERIA REMOVAL

Super-clean air, carrying moisture in vapor form only, is delivered by the Aprilaire's unique principle, incorporating the use of air filters and mineral coated evaporating elements. This exclusive humidification method removes up to 70% of the bacteria in the air stream circulating through the unit.

ISOTHERMAL OPERATION

The Industrial Aprilaire has no temperature effect on the humidified air. Exhausted, humidified air is discharged at the same temperature it enters the unit.

MINIMUM MAINTENANCE

Because the only liming or water solids deposits occur on the inexpensive, replaceable evaporating elements . . . mechanical difficulties from these usually troublesome deposits are eliminated.

INDUSTRIAL AND RESIDENTIAL MODELS AVAILABLE–WRITE FOR COMPLETE INFORMATION

see our catalog in PLANT ENGINEERING FILE or write for copy

RP . . . PRODUCTS OF RESEARCH

RESEARCH PRODUCTS Corporation

Dept. 913, Madison 10, Wisconsin

discipline

We discipline copper.

We put it through the roaring heat of our own smelter . . . the high-amp stillness of electrolytic refining tanks . . . the irresistible pressures of piercing mills and extrusion presses . . . the long reaches of our drawbenches . . . through coiling, annealing, straightening and testing equipment.

We work our will on copper—through every chemical change, every physical gyration known or needed—to deliver it perfect and enduring, yet submissive . . . as Lewin-Mathes seamless tube, pipe and fittings.

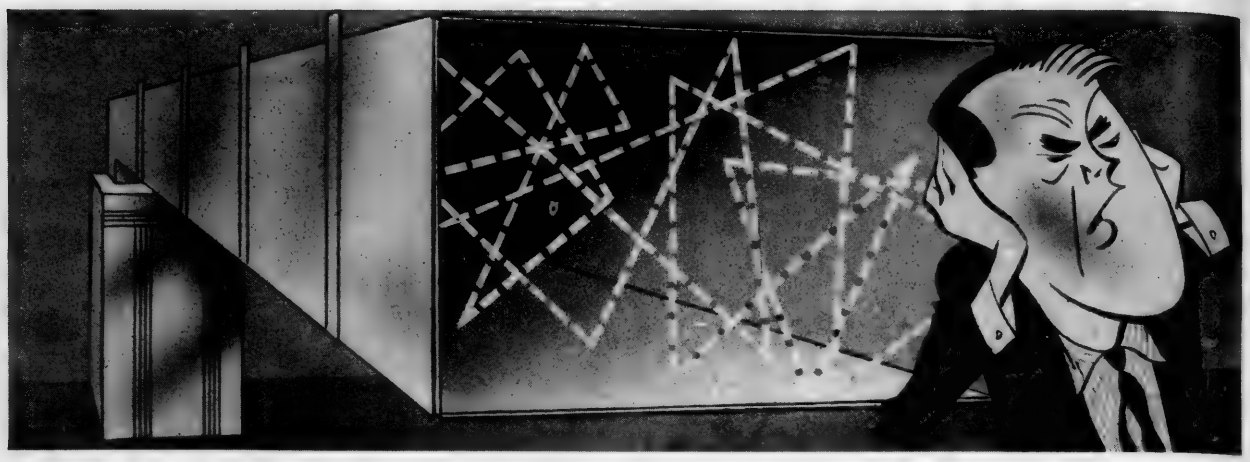
Like the ancient coppersmith, our pride of product is that of the *integrated specialist*. And the Lewin-Mathes nation-wide supply facilities serving you, we believe, are second to none.

LEWIN MATHES

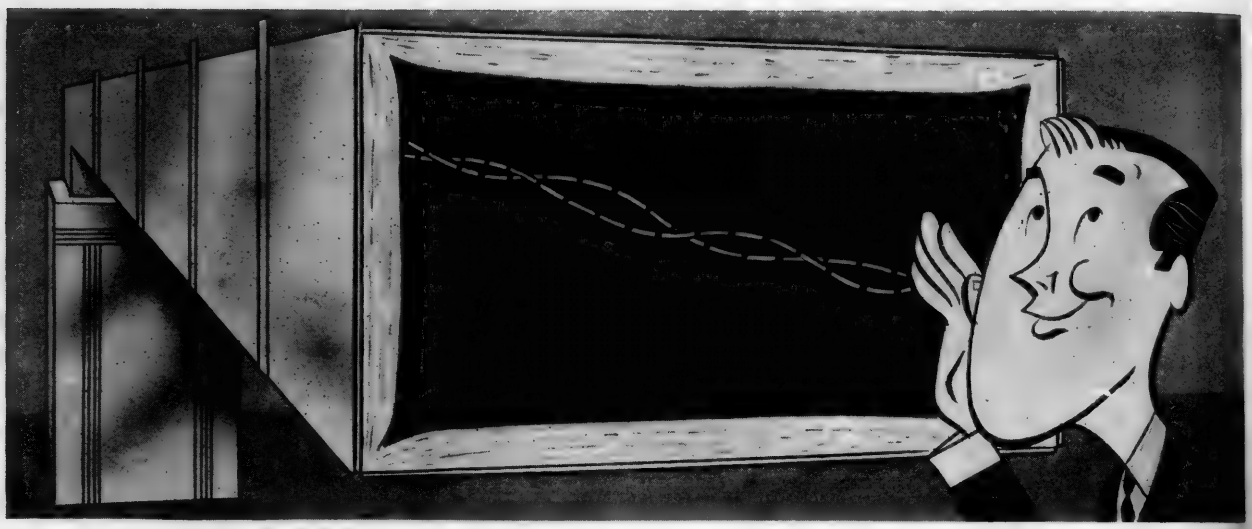
SAINT LOUIS, MISSOURI

COPPER AND BRASS TUBE PIPE AND ROD

DIVISION OF CERRO DE PASCO CORP.



Mute air-conditioning-duct noises...



with black-vinyl-coated MICROTEX

New duct liner has high acoustical and thermal efficiency... plus the moneysaving advantages of pigmented vinyl coating

Microtex Duct Liner effectively absorbs mechanical noises—particularly in the 250 to 4,000 cps range, where most air-conditioning and heating-system noises occur. It efficiently insulates warm- and cold-air ducts against heat transfer. When ducts are lined with Microtex, the sheet metal itself acts as a vapor barrier.

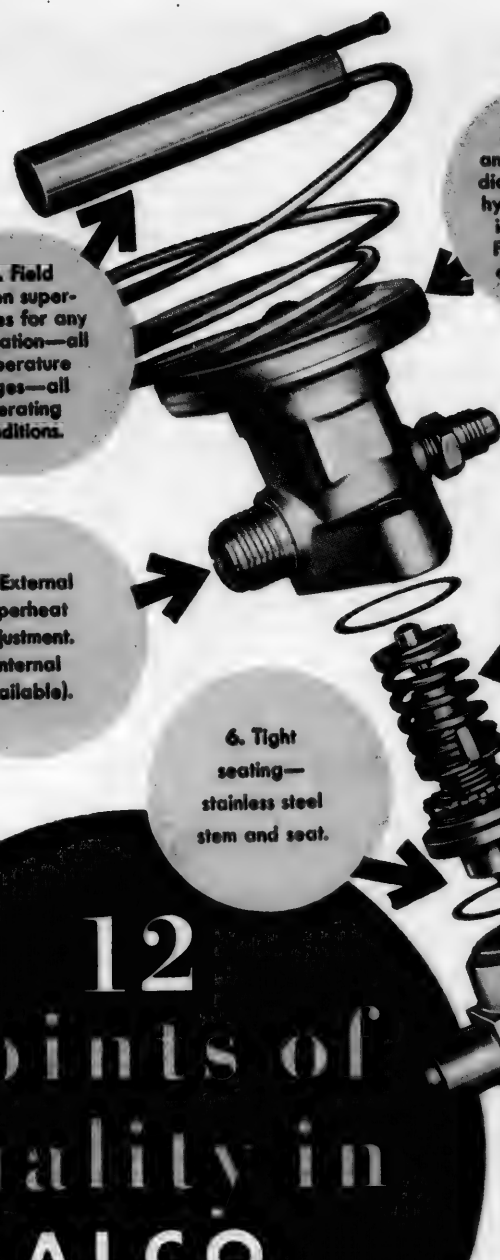
L·O·F Glass Fibers' Microtex Duct Liner saves time and money at the job site. Its black vinyl coating saves painting inside ducts, near grilles or large registers; eliminates the possibility of paint flaking off into the air stream. Pigmented vinyl quickly shows inspectors that Microtex Duct Liner is *fully coated* to resist air erosion, even at peak velocities. When ducts are lined, exterior surfaces are easy and economical to paint or finish as desired.

Microtex Duct Liner cuts costs in the shop, too. It's strong and resilient... easily withstands routine shop handling without damage. Microtex is semirigid, yet light in weight... easy to cut, pleasant to handle. Black vinyl clearly indicates the air-stream side as Microtex is applied to the sheet metal. Resiliency of Microtex permits forming insulated metal sheet in the brake without damage.

Get the facts today on economical Microtex Duct Liner in 1½, 2 and 3 lb./cu. ft. densities. Contact your distributor, or write: *L·O·F Glass Fibers Company, Dept. 63-28, 1810 Madison Avenue, Toledo 1, Ohio.*

L·O·F GLASS FIBERS

L·O·F GLASS FIBERS COMPANY · TOLEDO 1, OHIO



1. Field proven supercharges for any application—all temperature ranges—all operating conditions.

2. Power element case and stainless steel diaphragm atomic hydrogen welded into one piece. Field tested for over 25 years.

3. External superheat adjustment. (Internal available).

4. External equalizer. (Internal available).

5. Simple cage assembly contains only one packed stem. Replaceable for quick servicing. Interchangeable for wide capacity range.

6. Tight seating—stainless steel stem and seat.

7. Outlet connections to match distributor requirements.

8. Easy to install, light weight flanges—in widest variety of body styles and connections.

12 points of quality in ALCO

"T" SERIES THERMO VALVES

ENGINEERED THROUGHOUT FOR TROUBLE-FREE OPERATION!

9. Rugged come-apart constructions—corrosion-resistant materials.

10. Can be mounted in any position.

11. Simple, compact design — only three major parts—interchangeable to provide wide capacity and operation ranges.

12. Easy to inspect, clean and service without breaking line connections—no special wrenches or gauges required.

BUY QUALITY—BUY ALCO

NON-ADJUSTABLE, HERMETICALLY SEALED MODELS ALSO AVAILABLE

WRITE FOR BULLETIN 171-56

ALCO VALVE CO.

859 KINGSLAND AVE. • ST. LOUIS 5, MO.

The one complete line of refrigerant controls: Thermostatic Expansion Valves, Refrigerant Distributors, Solenoid Valves, Suction Line Regulators, Flooded Evaporator Controls and Reversing Valves.

7217

In 8 seconds Pittsburgh Superfine Fiber Glass Insulation is applied to a boiler panel with adhesive. On high-tack enamel finishes, Superfine is applied directly over the paint and baked on at 260° F.

"Pittsburgh Superfine fiber glass has satisfied our boiler insulation demands in every way"

—says Mr. E. J. Renner, Project Engineer, National-U.S. Radiator Corporation, Duncansville, Pennsylvania

"We use Pittsburgh Superfine to insulate boilers for home and commercial use," says Mr. Renner. "In comparison with the insulating material previously used, Pittsburgh Superfine has given us four advantages:

1. **EASIER TO HANDLE.** "It's lightweight, easier to warehouse, easier to move during manufacturing.
2. **CLEANER.** "Former material came in bags which sometimes broke, making an extra clean-up chore.
3. **EASY TO CUT.** "Cutting Superfine Fiber Glass requires no extensive layout or complicated system. Operator uses a 10-in. kitchen-style knife for this easy job.
4. **SHIPPING COSTS CUT 10%.** "On coal-fired and gas-fired boilers, insulation is applied by the contractor or the distributor. When we shipped former type insulation to them, special wire-bound crates were required. Now we ship Superfine Fiber Glass in cardboard containers and save 10% on shipping costs.

"We use one-inch, half-pound density Superfine to reduce heat loss in the boilers. This insulation is so effective that at normal temperatures—150° F to 212° F—the boiler exterior is only slightly above room temperature. Greater bulk of the other type insulating material would be required to do the same job."

HOW CAN PITTSBURGH SUPERFINE HELP YOU?

Let us show you! We'll be glad to work on your insulation problems with you right in your own plant. For technical assistance, call your nearest PPG Sales Office or write us direct. *Pittsburgh Plate Glass Company, Fiber Glass Division, One Gateway Center, Pittsburgh 22, Pennsylvania.*

Light-weight, easily handled Superfine is quickly cut with kitchen-type knife. Use of Superfine cuts shipping costs 10% on two types of boilers at National-U. S. Radiator.

PITTSBURGH SUPERFINE INSULATION IS A PRODUCT OF PITTSBURGH PLATE GLASS COMPANY

Sales Offices are located in the following cities: Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh and St. Louis

FIBER GLASS PPG PAINTS • GLASS • CHEMICALS • BRUSHES • PLASTICS

PITTSBURGH PLATE GLASS COMPANY

READING COPPER TUBE

say where . . . . . . it's there!

Reading Tube depots are strategically located from coast to coast, so that there's always one within easy reach of your warehouse.

That's why you can always be sure of getting the right amount of Reading Copper Tubing, at the right time, to meet even the most urgent orders. Another reason why more and more wholesalers are making it their business to specify READING Copper Tube.

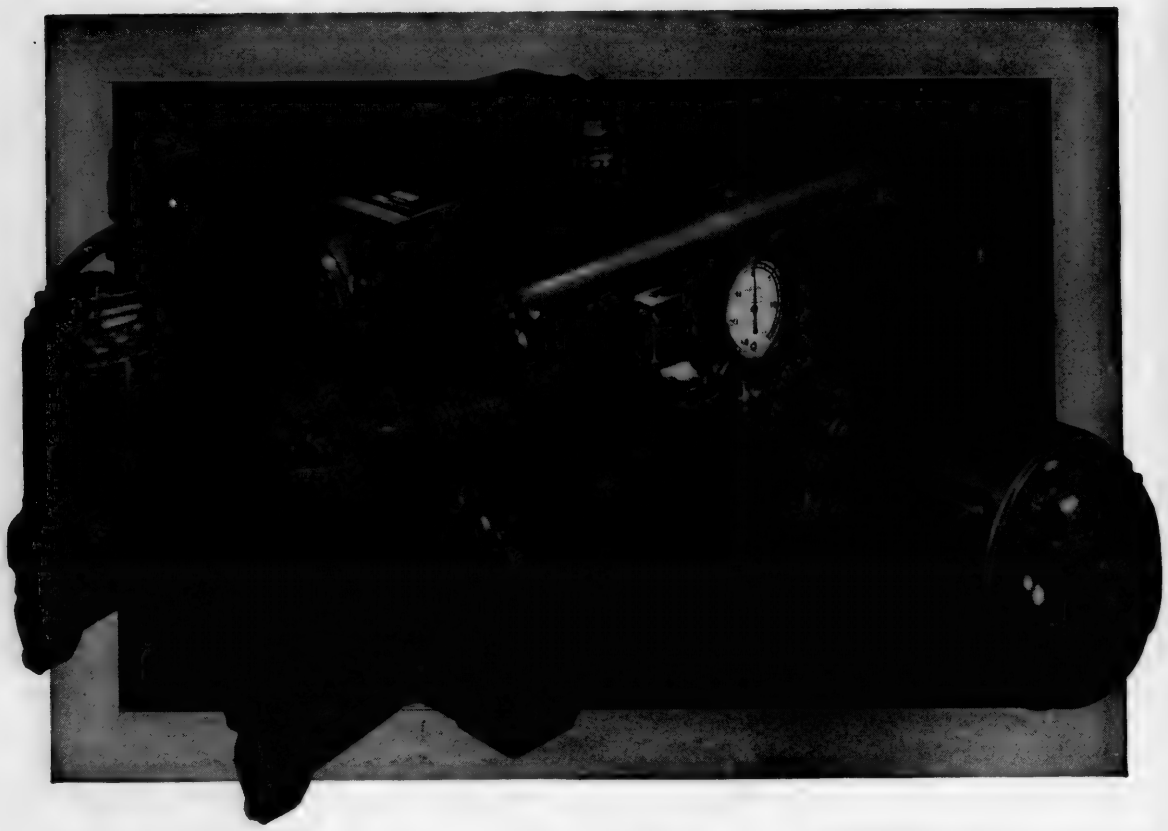
Sold Through Wholesalers Only

READING TUBE CORPORATION

Empire State Building, New York 1, N. Y. • Plant: Reading, Pa.

Distribution Depots: READING, PA. · WOODSIDE, L. I., N. Y. · CHICAGO, ILL. · HOUSTON, TEXAS · DALLAS, TEXAS · OAKLAND, CALIF. · LOS ANGELES, CALIF. · DENVER, COLO. · CLEVELAND, OHIO · ATLANTA, GA.

THIS NEW VACUUM HEATING PUMP IS SIZED TO ACTUAL JOB REQUIREMENTS



It's the Nash CSM

No longer is it necessary for the Engineer to accept a vacuum heating pump with air and water capacities based inflexibly upon square feet of equivalent direct radiation. With the flexible Nash CSM he can provide for proper air capacity in accordance with his judgment and experience. For the individual capacities of the separate pumps on the CSM may be varied within a wide range, without buying an oversize receiver and oversize water pumps.

These pumps possess many other features which permit a more efficient utilization of fuel and minimum use of electric power. Low, low, returns reduce installation costs and usually eliminate putting the pump in a pit. Simplicity and efficient operation reduce supervision and maintenance costs. Information regarding this new heating pump development is available immediately upon request.

- Increased air capacity induces rapid system response without wasteful overheating.
- Separate air and water pumps individually selected to meet actual job requirements.
- Control system that operates individual pumps only when needed.
- Flexibility permitting addition of radiation without changing basic pump installation.
- Low, low, return line connection.

NASH ENGINEERING COMPANY
438 WILSON, SO. NORWALK, CONN.

Filtering Radioactive Particles from Stack Gas

H. E. ANDERSON
Engineering Consultant
Burbank, California

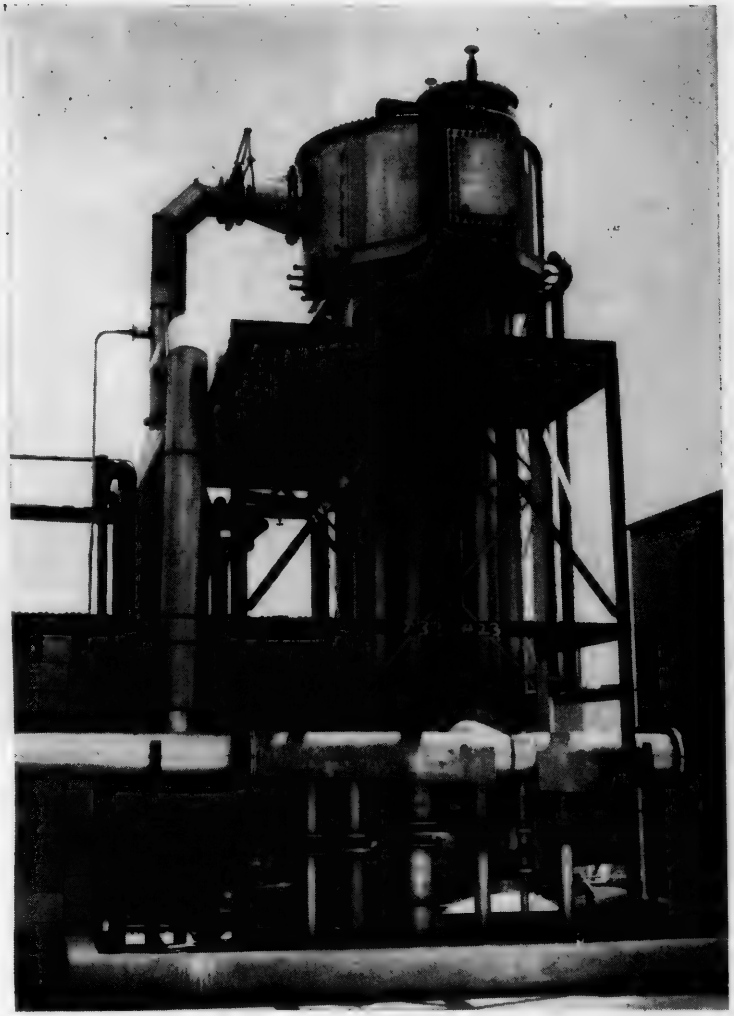


Fig. 1. A water-flushed pipe type Cottrell electrostatic precipitator used in the off-gas system of the ORNL Iodine and Isotope Recovery Operations. Courtesy, Oak Ridge National Laboratory, operated for USAEC by Union Carbide Nuclear Corporation.

Following is an evaluation of various devices for filtering particulate radioactivity from radiochemistry off-gas systems by one who as employee, consultant, student and teacher has acquired a broad familiarity with this very modern, very thorny air-pollution problem. No panaceas are presented, yet enough is contained herein for forming the basis for sound engineering selection of equipment.

REMOVAL of radioactive suspended particles, vapors, and gases from "hot" exhaust systems before discharge to the atmosphere is a serious problem confronting all radiochemistry installations, and is necessary in order to prevent dangerous contamination of the immediate and neighboring areas. The concentration of contamination on some days, or periods during the day, exceeds others. This contamination may be released in large bursts depending upon the nature of the operation and stages in progress. Dirt impedes air flow and sometimes particles are blown through because of the high velocity through sections of the filter. It has been found necessary to try a number of different filters, filter media, and filtering equipment; Fig. 1 shows one piece of equipment used at Oak Ridge. The efficiency and maintenance of each is dependent upon keeping such filters clean and varies in its application to radioactive dusts and gases.

The gases themselves may be radioactive, containing radioactive argon, A, or carbon $C^{14}O_2$, for example, or they may contain radioactive vapors, and in such cases, even 100-percent removal of all suspended matter will not be a complete solution of the problem. However, removal of practically all of the suspended material is a long step toward preventing radioactive contamination by stack discharge. Increasing the height of the discharge stack to improve waste disposal to atmosphere is a false illusion; the pollution discharge from a tall stack will be carried to points farther away.

Problems of Atmospheric Radioactive Contamination

Air pollution that is brought about through radioactive stack gas wastes discharged from ventilation systems is only partially avoided by filter devices, no matter how efficient they may be. In systems utilizing filter media such as paper, cloth, Fiberglas, etc., the eventual build-up of activity through dust-loading occurs, and likewise in electrostatic precipitators. The methods[1] of disposing

[1] Superscripts refer to references at end of article.

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the final waste from the systems present additional problems, namely:

1. Burning results in stack gas and particle discharge; a cycle of the entire problem over again;

2. Direct burial results in redispersal and ground contamination with associated problems related to ground water table; a health hazard with area limitation and economic factors to be considered;

3. High dust or particle loading capacity results in high radioactivity. Alpha-active material is a health hazard during handling. Beta-gamma active material must be discharged from the system continuously to prevent a build-up of activity, or some means must be devised for proper storage and disposal at regular intervals. Maintenance necessitates handling; a health hazard in transporting to disposal area resulting in high costs;

4. Vapors, acid fumes, and unfilterable gases cause rapid deterioration and disintegration of filter media resulting in a maintenance and health hazard problem;

5. Mechanical replacement is high in cost; and

6. An auxiliary unit for emergency or maintenance shut-down must be available to prevent possibility of reverse flow of air stream out of "hot" equipment into controlled rooms and areas.

Commercial equipment is presently manufactured and widely used in industry for separating dust, mist, and fume from gases on a large scale. Information regarding particle size is important from the standpoint of the ultimate physiological damage which can occur, since the size of a given particle will determine the probability of its reaching lung tissue through inhalation, or eventually reaching blood forming tissue through ingestion.

In most instances of radioactive suspensoids to be separated from large gas or air streams, separation equipment is required to perform a very efficient job, allowing much less than 1% of the suspended material to escape on a weight basis. This limits the selection of equipment, and has led some investigators to study the possibilities of such unconventional devices as steam ejector nozzles as a means for dust separation.[2]

We are concerned here with the features and materials for filters which offer the most efficient and practical means of filtering airborne radioactive particles from ventilation exhaust streams so minute that they penetrate and pass through the majority of present filter media.

Hersey Reverse-Jet Filter

A filter of the Hersey type,[3] employing what is called reverse-jet cleaning, is one of the most efficient types of dust collectors for large-scale industrial service. These work on the same principle as a household vacuum cleaner bag, except that the bag material is a hard wool felt of the pressed type, about 1/16 inch thick, or a Fiberglas cloth woven of glass fibers, and except that the bag is cleaned continuously while it is in service by means of a reverse air jet. This jet is applied to the bag by means of a hollow metal ring surrounding the bag and just touching it, the ring being slowly and continuously moved up and down from top to bottom of the bag. Air is supplied to the ring by a blower of the Roots type at a pressure of the order of 3 psi. Dust blown out of the bag walls by the reverse air jet eventually settles and collects in the hopper below the bottom header sheet to which the bags are attached at their lower ends. The size and number of the bags in the installation determines capacity in cfm which can be filtered at a given pressure drop, which is usually of the order of 2 to 7 inches of water. A small (2 bag) unit of the type just described is illustrated in Fig. 2.

When the bags are new and clean each square foot of their area will pass about 17 cfm at a pressure of only ½ inch of water, assuming wool felt. However, after a few minutes of operating the felt bag walls will be impregnated with dust weighing 2 or 3 times as much as the felt, in general, before equilibrium is attained and the reverse jet removes the dust at a rate equal to that at which it accumulates. Under equilibrium condition filtering action is performed mostly by the dust in the bag walls rather than by the felt itself, and gas flow is likely to be around 10 to 40 cfm per sq ft of bag area when the pressure drop is maintained at usual values such as 2 to 7 inches of water.

Evaluation: 1. Efficiency of a Hersey filter as measured by industrial standards is ordinarily so high that it cannot be measured by the weighing techniques usual for determining efficiencies of industrial dust collectors, but instead may be estimated by microscopic counting of the dust particles escaping in a known volume of gas.

2. Efficiency of a bag filter is not as high for particles less than ½ micron in diameter as for larger particles.

3. Bag filters which are cleaned periodically by shaking them with automatic shaking devices ordinarily require more bag area per cfm of gas handled than Hersey-type filters.

4. The puff of dust which escapes following the shaking operation is objectionable, and the problem of maintenance in this instance presents a contamination and radiation hazard.

5. Some of the principal disadvantages of bag filters as compared with other types of collectors may be listed as follows:

(a) They require a considerable pressure drop (of the order of 2 to 7 inches of water) for successful operation.

(b) They will not work well with gases containing mist or wet particles.

(c) They require more maintenance than some other types of collectors of equal capacity, and if not well maintained they are quite unsatisfactory, for

example, when operating with a leaking or damaged bag.

(d) Glass bags must be used for temperatures above 300 deg F and for corrosive material, and to date, glass bags have been found to have a greater maintenance cost than wool ones.

Baffle-Plate Scrubbing Tower

Another method of treating contaminated exhaust air before discharge to the atmosphere is accomplished by use of a baffle-plate scrubbing tower with several stages of plates and a set number of plates per stage. In the operation of the baffle-plate scrubbing tower a significant increase in the efficiency is encountered with an increase in temperature of the water. It may be that this is due to a better wetting action. It has also been found that what is known as the cloud-chamber effect, or excess humidity through fogging, increases the ease of collection with certain particle limitations.

Evaluation: 1. The advantage claimed by this wet method over the dry is that solid material collected from the contaminated exhaust stream is very small in actual mass when compared with liquid wastes accumulated from the same operation.

2. The system is relatively effective on gases.

3. Investigation covering changing of water supply or recirculating has shown the latter procedure useful for considerable periods of time without apparent adverse effect. Evaporation is made up by fresh supply.

4. Draining, flushing, and refilling reservoirs indicates no improvement in the collection efficiency of the unit.

5. Insoluble radioactive salts, soluble salts, and other radioactive particles which may form a solution, suspension, or sludge in the reservoir result in fairly high radioactivity of the wetting agent.

6. Precautions must be taken during maintenance to avoid carry-over, since wetting agents attain high contamination levels in relation to the air filtered, and as minute a quantity as a few drops of entrained liquid carried over would be deposited on a preheater or filter.

Venturi Scrubber

Some attention has been given to the use of Venturi scrubbers[4] for removing radioactive dust from gases. Some important disadvantages of scrubbers are that they present the difficult problem of separating the solid material from the water in which it is suspended, considerable power is needed to drive the main fan in order to build up the required pressure drop, maintenance and corrosion are serious problems, and considerable quantities of water are required.

Electrostatic Precipitator

Applications necessitating relatively rigid requirements make use of electrical precipitation filters of the stationary type. More rigid requirements employ the traveling plate electrostatic filter. This latter type of unit offers higher dust-loading capacity and cleaning efficiency for standard industrial application. The Cottrell precipitator has been widely used in industry. Precipitators of this type handle gases at temperatures ranging from sub zero to 1000 deg containing dust or fume at concentrations which often reach several grains per cu ft, and they collect several tons of dust per day or per hr, as a rule.

Those unfamiliar with problems of filtering radioactive particles from exhaust ventilation streams often are unaware that radioactive particles can be given electrostatic charges and that radioactive airborne particles, moving within a "hot" exhaust ventilation system, when given an electrostatic charge, can be collected on grounded surfaces. The fact that the particles are radioactive should have very little to do with their behavior in an electrostatic separator. Experiments conducted with precipitators[5] using the alpha emitter polonium, and in other experiments, the beta emitter sulfur 35, indicated that neither material behaved in a way which was different from non-radioactive material as far as could be determined.

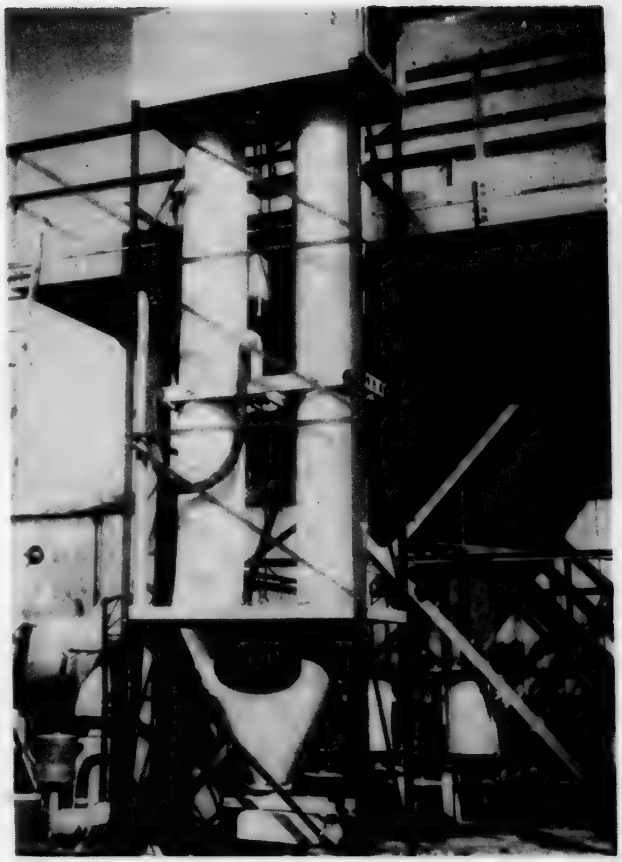

Fig. 2. Hersey type industrial bag filter with reverse-jet cleaning. Courtesy, Western Precipitation Corp., Los Angeles, Calif.

On the theoretical side, take, for example, a mist consisting of droplets of aqueous $CoCl_2$ solution suspended in a gas, the Co being radioactive Co^{60}, and the droplet diameter assumed as 1 micron. $CoCl_2$ solution in a 5-ml glass ampoule, having an activity of 1.6×10^6 disintegrations per sec per ml is listed as one of the most radioactive standards for calibration purposes[6]. Now, a 1 micron droplet has a volume of 5×13^{-13} ml, and in an electrical precipitator such a drop will acquire an electrostatic charge of about 150 electrons. By multiplying 1.6×10^6 by 5×10^{-13} we obtain approximately 16^{-6} disintegrations per sec., or one disintegration about every two weeks; the rate of radioactive disintegration that will occur in such a drop of the $CoCl_2$ solution. The few charges involved in the disintegrations and the relaitvely small amount of ionization effected by emitted particles are negligible. When compared to the large

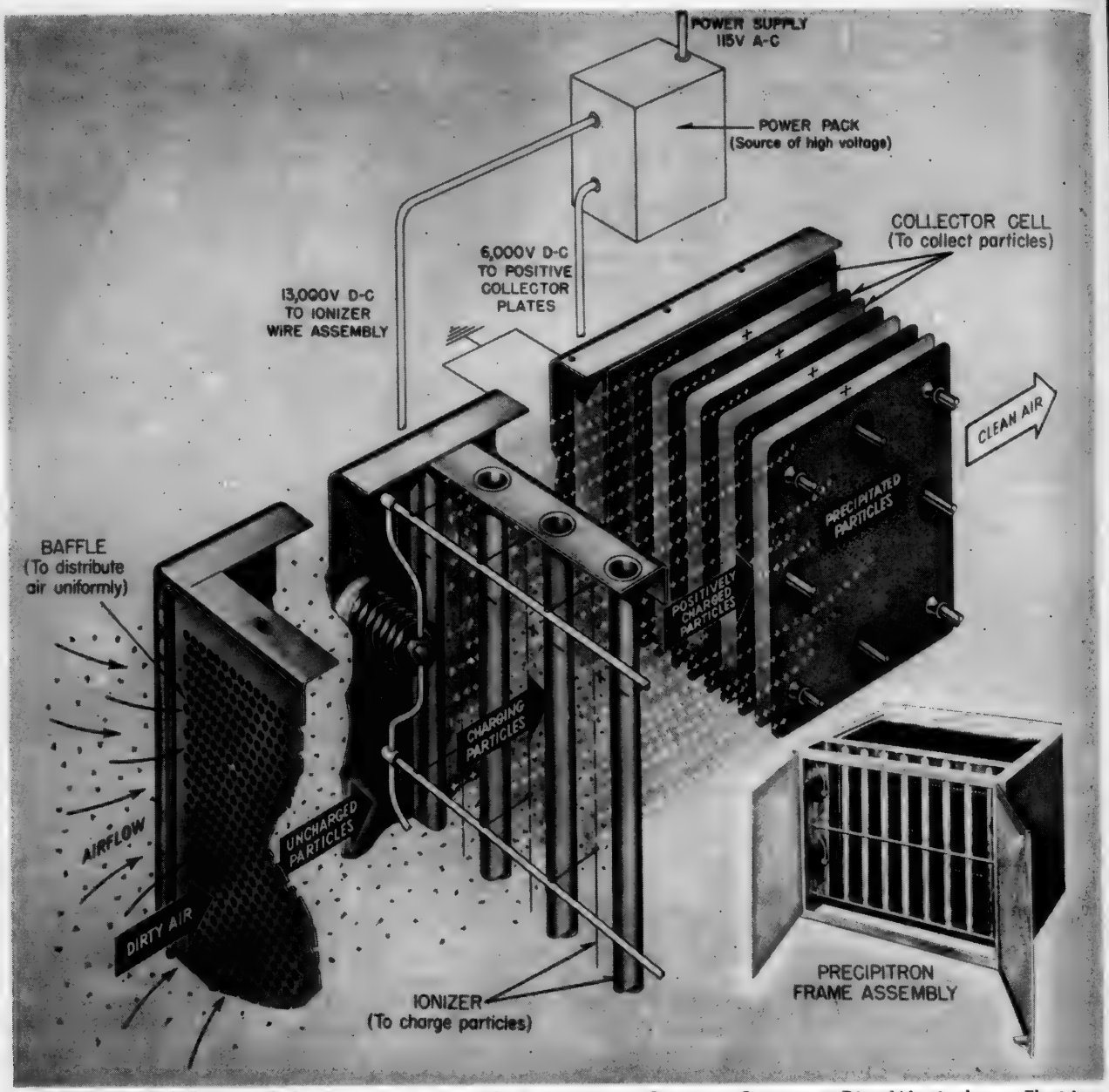

Fig. 3. Exploded view of the Precipitron principle in operation. Courtesy, Sturtevant Div., Westinghouse Electric Corp., Boston, Mass.

number of ions and charges involved in the operation of the collector, such activity will have no measurable effect upon droplets carrying an average of 150 electronic charges each through a precipitation process that lasts only a few seconds at most.

The tractional efficiency of a precipitator is given by the Deutsch equation[7],

$$E = 1 - e^{-wf}$$

where w is the drift velocity at which the charged dust particles move towards the collecting surface under the influence of the high voltage electrical field, and f is the specific collecting surface, or sq ft of collecting electrode area per cu ft of gas flowing per sec. If f is in the units just mentioned, then w will be in fps. If w is the average drift velocity for all the particles, then E will be the actual efficiency. However, w is greater for large particles than for small ones, being directly proportional to the particle diameter and the square of the electric field strength (for particles having a diameter exceeding 1 micron), and inversely proportional to the viscosity of the gas. Therefore, the highest voltage which can be applied to the high tension electrode without undue sparking is ordinarily applied. The drift velocity of the most minute particles, such as particles of tobacco smoke, is then ordinarily large enough so that only a small fraction of 1% of them will escape if the gas is passed through the precipitator pipes at a slow rate, such as 1 fps. As gas flow rate is increased so that the gas velocity through the pipes reaches 5 or 10 fps, instead of the 1 fps value previously assumed, f decreases to 1/5 or 1/10 of its previous value, and the efficiency decreases accordingly, as indicated by the Deutsch equation.

For example, efficiency will decrease from 99.99% to 99.90% by weight if gas velocity, which yields the former efficiency, is increased by 33%. This means that one can continue to increase the efficiency for a given gas flow rate by increasing the size (and cost) of the precipitator by using more pipes or longer pipes or both. The closer one approaches 100% efficiency however, the less one will gain by doubling the size (and cost) of the precipitator, for a given gas flow rate. Since the cost of a precipitator per cfm of gas handled depends upon the efficiency required, the materials specified for its construction (steel, lead, etc.), and the gas flow rate itself, it is very difficult to state even an approximate cost figure. Roughly, a figure of $1-20 per cfm for precipitators for atomic energy plants may be mentioned.

The principle of operation of electrostatic precipitation is based upon the fundamental concept of electric charge which states that bodies of like charge repel; those of unlike charge attract. Airborne dust, dirt and other solid particles moving within the "hot" exhaust system which have become radioactive, when given electrostatic charges may then be collected on grounded surfaces.

Three basic operating elements are required for the air cleaning function. There are, (1) an ionizer for charging the dust particles, (2) cells for collecting the charged particles, and (3) a power pack for supplying the d-c potentials to energize the ionizers and collector cells, as illustrated in an exploded view of the Westinghouse Precipitron, (Fig. 3).

An ionizer is made up of a series of vertical tubes between which small wires are suspended from all electrically insulated framework. The vertical tubes, being a part of the frame, are at ground potential. The wires are energized with 12500 to 13300 volts d-c supplied from the power pack. The application of the high voltage to the wires causes electrons to flow across the space between the wires and the tubes, creating an ionizing zone through which all exhaust must pass. The airborne dusts and dirt particles pick up electrical charges in this zone.

Collector cells are mounted immediately behind the ionizers. These cells comprise an assembly of many flat plates equally spaced from one another, and arranged in two sets, one of which is grounded and the other insulated from ground. The insulated set is energized with 5000-6000 volts d-c from the power pack which creates a strong electrostatic field between alternate plates. As charged particles are carried into the cells and between the plates, this electrostatic field forces the charged particles out of the air stream and onto the surface of the plates where they remain by adhesion. To insure adhesion of particles, the plates are coated with an adhesive fluid which permits greater dirt-loading capacity. Fire-retardant adhesives have been developed to serve two functions: (a) to bind the dirt to the collector plates as it is precipitated; and (b) to render the deposit completely washable with hot water, the presence of a detergent in the adhesive making this possible.

Air baffles, with a free area of 32% of the gross face area, are incorporated to provide more uniform air flow. This assures overall efficiency of the unit by distribution of a proportionate volume of air to every frame group. The power pack consists of a cabinet enclosing transformers, rectifier tubes and capacitors; and provides the energizing voltages for the ionizers and cells from a 115 volt a-c power source. Protective devices and other accessories are incorporated for safe operation, maintenance, and repair.

Cottrell precipitators are built in a wide variety of sizes and designs. One common design places the (grounded) collecting electrodes in the form of vertical plates, rods, or channels, arranged in parallel planes about 8 or 10 inches apart within a chamber through which the gas flows horizontally, with the high-voltage discharge electrode wires or rods placed vertically in planes half way between adjacent collecting electrodes. Dust is precipitated dry upon the collecting electrodes, from which it is dislodged by rapping the electrodes automatically at appropriate intervals. The dislodged dust falls into hoppers underneath, and by proper design and operation, the percentage of the dust which is re-entrained in the gas stream while it is falling into the hoppers can be kept so low that the loss is a small fraction of 1%.

However, in order to reduce this rapping loss to zero, the precipitator may be designed as a system of vertical grounded pipes 6, 8, 10 or 12 inches in diameter with a discharge wire or rod hung vertically along the axis of each pipe. The gases flow upward through these pipes, the inner walls of which are continually flushed by a film of water running down from a pond and weir arrangement at the top. In this arrangement, the dust is precipitated directly upon the water film and continuously carried down by it to a pool at the bottom.

Thus far, both this water-flushed pipe type of single-stage industrial precipitator and the air-conditioning type of 2-stage precipitator have been used for separating radioactive dust and fume from gases at atomic energy plants and laboratories. A Cottrell electrostatic precipitator of the water-flushed type with design capacity of 200 cfm is installed in the off-gas system of the ORNL Iodine and Special Isotope Recovery Operations and the Isotope Production Areas to evaluate its efficiency in collecting and removing particulate radioactivity[8]. This precipitator consists of 23 vertical collecting pipes with an ionization wire centered in each pipe. The inside surfaces of the pipes serve as collecting walls. For wet operation, the collecting walls are water flushed by means of spray nozzles installed at the top of each pipe as has been described. This water is recycled continuously at the rate of 35 gpm over the collecting walls while high voltage is applied to the electrodes. A summary of the report[9] covering the evaluation of this unit states that the Cottrell electrostatic precipitator will collect more than 99.99% of the particulate radioactivity in the off-gas at 50 to 55 kilovolts when "the concentration of radioactivity as solids is greater than 5.0×10^{-4} microcuries per cubic centimeter of off-gas." The collecting efficiency of the Cottrell increased when the voltage was increased and the concentration of particulate radioactivity constant.

The summary further states that at constant radiobarium concentration of 7×10^{-4} microcuries per cubic centimeter of off-gas, the removal efficiency ranged from 99.1% at 30 kilovolts to 99.98% at 55 kilovolts. The Cottrell was more efficient during dry operation since higher voltages could be used. Apparently the use of water flushing limits the voltage and consequently the efficiency due to arcing. Figure 1 is a photo of the water-flushed pipe precipitator just described, and Fig. 4 is a sketch showing its internal construction.

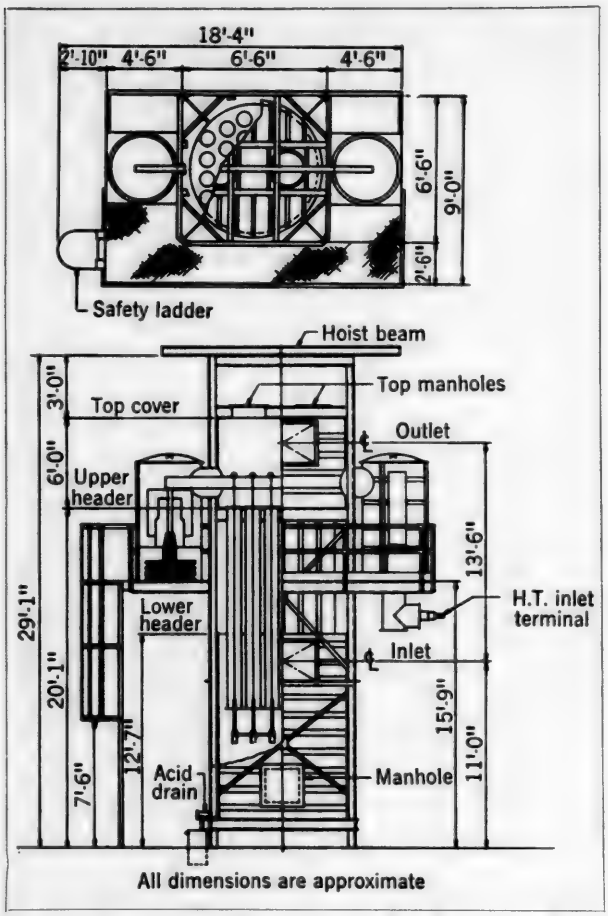

Fig. 4. Sketch showing construction details of a small size (13-pipe) water-flushed type industrial precipitator. Courtesy, Western Precipitation Corp., Los Angeles, Calif.

Evaluation: 1. Electrostatic precipitators are not intended to collect the *ultra* fine particles which may be discharged from radio-chemistry installations.

2. With uneven airflow, the air velocity through some of the collector cells may be sufficiently above velocity limits to blow off collected wastes which would then be discharged to the asmosphere.

3. Efficient operation depends a great deal on the regularity with which the unit is cleaned. At best the electrostatic precipitator is only approximately 90% efficient. This may be demonstrated by the fact that dense clouds of tobacco smoke fed into the precipitator will escape from it in concentrations great enough so that the escaping smoke can be seen. The blue color of tobacco smoke is evidence that most of its particles have a diameter less than the wavelength of light, which is roughly ½ micron.

4. For absolute efficiency an after-filter of the Cambridge or MSA Ultra-Aire type is necessary to catch the dirt should the precipitator short circuit.

5. Difficulty may be experienced if the dust-load builds up faster than it can be removed, eventually becoming so heavy that arcing occurs between the dirt bridges resulting in a fire hazard.

6. Devices such as the Cottrell and the Precipitron accomplish only one phase of the problem. The final disposal of radioactive wastes collected and accumulated during operation and maintenance still remains.

Other Types of Filters

Fiberglas has been used as a filter medium with relative success and found to be effective in the operation of radiochemistry hoods, canopies, and gloved boxes at the University of California Radiation Laboratory. The use of Fiberglas was also proposed for hood and dry box filters at the Hanford Engineer Works as early as 1948.

Among the most efficient light-weight inorganic filters developed to date is a Fiberglas unit consisting of superfine glass fibers drawn as a continuous filament 28/100,000 inch in diameter and designated as Type *E*. When packed to a density of 1½ lb per cu ft, the material forms an extremely lightweight filter unit which consists of approximately 1% material and 99% air.

The Fiberglas Basic Fiber No. 28, from which the filters are made, (See Fig. 5) will withstand temperatures up to 1000 deg. They are non-combustible and have extremely low thermal conductivity and low heat capacity. The fibers are non-cellular, are like minute rods of glass and do not absorb moisture, however, water can enter the interstices. The material is non-settling, noncorrosive and durable; since it is completely inorganic it is highly resistant to acid fumes and vapors.

The installation replacement costs are minimum, and final disposal of used filters may be accomplished by incinerating at over 1000 deg. This melts the glass fibers, reducing the physical mass to the size of a glass bead. Thus Fiberglas filters provide, in part, a very good solution to the problem of control and final disposal of radioactive contaminants.

A paper filter medium, originally identified as CWS-6, followed by an advanced type, CC-6, is used with adequate effectiveness as a space filter. These filter papers were developed by the Mine Safety Appliance Company and have been placed in use at AEC and other installations. The MSA Ultra-Aire Space Filter composed of asbestos cellulose paper has now been replaced by Type 1106B Glass Fiber Web. It is designed and manufactured in corrugated form to increase the available filter area and loading capacity, and to reduce initial resistance. The filter units are tested at rated capacity with standard U. S. Chemical Corp's test equipment for resistance and initial penetration, are unconditionally guaranteed to be at least 99.95% effective against 0.3 micron diameter

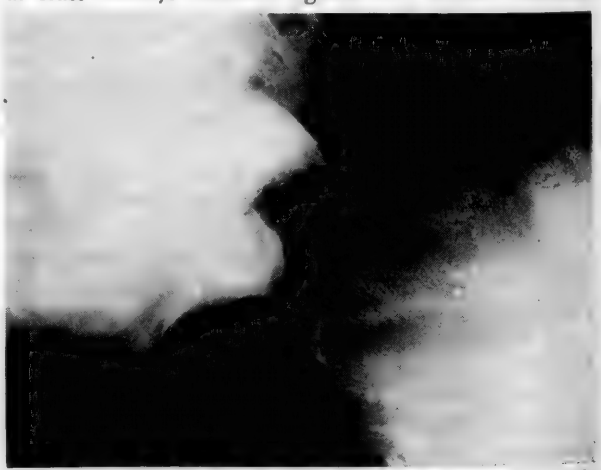

Fig. 5. Fiberglas Basic Fiber No. 28, approximately 0.00028-inch diameter. Photo courtesy Owens-Corning Fiberglas Corp., Toledo, Ohio.

DOP (dioctyl phthalate) particles. This new filter will perform as well as, or better than Type CC-6, and in temperatures up to 1000 deg, according to MSA.

Conclusion

Filters are made in forms other than the bag type for removing radioactive dusts, and various other materials besides wool-felt and Fiberglas cloth have been used for this purpose, but space will not permit a detailed discussion of all of the types of filters which have been installed. The use of the Cambridge absolute filter, Type CC-6, and CWS-6 MSA filters in atomic energy facilities is fairly common.

As in the case of the electrostatic precipitator, bag or unit type dry filters solve only the initial problem. Final disposal by incineration, burial, or some other practical means must follow. The attendant problems associated with disposal have been initially stated and likewise apply here.

There are safe limits for the discharge of some radioactive pollutants to the asmosphere. However, maximum permissible limits will not be set for many radioactive isotopes until such time as experimentation and test have definitely proven representative figures to be accurate and correct. Limitations have been set for P^{32}, I^{f31}, C^{14} and other isotopes with reasonable assurance, for these isotopes constitute over 90% of the activity distributed by the Oak Ridge Isotopes Division and, therefore, those of which we are most informed.

Collecting devices such as electrostatic precipitators, filter units of the bag type, and scrubbers should be used where necessary to remove radioactive contaminants from "hot" exhaust before discharge. These devices should be followed with a high-efficiency, dry after-filter of the fibrous type. It is important to bear in mind that the absolute filter has a collection efficiency well beyond that of the electrostatic collector when considering radioactive particulate matters which are submicron in size. Controlled incineration is a practical process if the collectors used will remove enough of the activity in the combustion gases to allow subsequent venting to atmosphere without producing concentrations sufficient to constitute a biological hazard. The type of unit, its efficiency, ease of replacement, servicing and maintenance are of important significance. However, final selection of a filter unit will be as dependent upon the official permissible contamination limits of air as set forth by the Code of Federal Regulations and the AEC, as it will be upon engineering and economic factors.

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Proper Hospital Ventilation Will Save Many Lives

The major intestinal diseases have largely yielded to improved community sanitation. Immunization has virtually conquered diptheria, smallpox, and tetanus; and streptococcal disease has been much subdued by the antibiotics. We are left now especially with staphylococcal disease, an insiduous and frequently overlooked disease which has survived the onslaught of community sanitation, immunization, and the antibiotics, only to emerge from our hospitals as probably the foremost parasitic cause of death in many modern communities.

Air has frequently been indicted as an important source of staphylococcal infection, report Reimert T. Ravenholt, M.D., Seattle-King County Department of Public Health, and Otto H. Ravenholt, senior medical student, University of Minnesota. Many workers have cultured staphylococci from hospital air, and in a number of circumstances, such as in the dressing of burns and wounds, in surgery, and in greatly crowded nurseries, contaminated air is undoubtedly an important factor in its transmission. But air is only an important vehicle in transmission when highly susceptible patients are exposed to air which has been contaminated with organisms from lesions, carriers, or depots.

There is little doubt, the authors conclude, that special attention to air hygiene is needed in operating and dressing rooms where burns and other wounds are exposed. If proximal sources of air contamination, such as contaminated surgeon's clothing, are controlled, adequate air hygiene in dressing or operating rooms can be maintained by positive pressure provision of 20 to 30 turnovers of clean air per hour. Disinfection of room air by means of chemicals or ultraviolet radiation is not an adequate substitute for good ventilation. Good air hygiene throughout hospitals is especially the product of good housekeeping, sterilization and oiling of blankets, clean clothing worn by clean personnel, occlusive dressings of suppurating wounds, good aseptic technique, and adequate segregation of infected and susceptible patients.

There is at present a growing appreciation that a correlation does exist between the degree of staphylococcal contamination of the hospital environment and staphylococcal disease of patients and staff. No longer can stapyhlococci be regarded as necessarily ubiquitous in hospitals, nor discounted as "contaminants" when found in specimens from sick or dead patients. Hospital-acquired staphylococcal disease is now recognizable as a formidable cause of illness and death in contemporary society. Its prevention can be achieved by improved measurement of its occurrence, by forthright application of current knowledge and materials to provide a thoroughly sanitary hospital environment; and by more judicious use of improved hospitals by an enlightened community.

Six Keys to Good Flow Control

in hot-water coils for air conditioning

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Ignorance of flow-control valve principles will lead to frustration by those who specify, as the unexpected interplay of valve, pump, and coil characteristics brings about the opposite of what is intended. Theory and practice are presented and conclusions summarized, to the end that coil output may be predicted and accurately controlled.

WHEN water is used as the heat transfer medium in air conditioning systems, it can be controlled as follows:

1. Vary the flow of the water supply to the unit.
2. Vary the temperature of the water supply.
3. Vary the volume of air passing over the unit.

To control flow of water into an air conditioning unit requires a control valve. To make use of such a device, the fundamentals of valve design should be thoroughly studied. Usually it is desired to vary the heat in some predictable manner, and most often it is a straight line function as illustrated in Fig. 1.

If the heat output from a water coil is linearly related to flow, a valve should be selected whose flow characteristics are linear. In designing such a device, computations must be based on the fact that as the valve operates through its stroke, the pressure drop across that valve remains a constant. This is the only base that can be used, otherwise it would require a different valve design for each job. Therefore, each valve is designed on the basis of a constant pressure drop and is tested in a like manner. Such a test setup is illustrated in Fig. 2, where the pressure side of the valve is held constant, either by holding the level in the tank or by applying air pressure to the tank and maintaining constant air pressure as the level changes. Thus the pressure drop across the valve will be constant for all stem positions of the valve, because the low side is atmospheric pressure, which, for practical purposes, is constant. Therefore, a valve with a linear flow characteristic is defined as follows: "The flow is linear when the pressure drop across the valve remains constant for all positions of the valve stem travel."

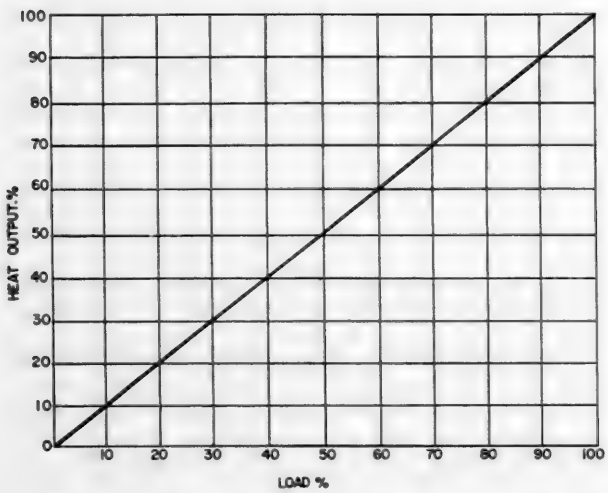


Fig. 1. Desired control curve for air conditioning.

Such a condition rarely exists in a temperature control system as other flow restricting devices, such as the coil and associated piping, are located within the closed loop and must be taken into consideration. See Fig. 3. Pressure drop across the control valve can never remain constant unless the full-flow pressure drop across the valve is 100%. Obviously, this cannot occur, as there would be no force left to move the water through the coil and pipe once it had passed through the valve.

The usual practice in the past was to allow 10% of the total pressure drop for the control valve. As illustrated in Fig. 4, with the valve wide open, 1 ft of head is lost in the valve and the remaining 9 ft are to overcome coil and pipe resistance. Fig. 4 shows a tank providing constant supply pressure to eliminate discussion of the effect of the pump at this point.

When the valve is closed, there is no flow, as the pressure is ten feet on the high side of the valve and zero on the low side, a pressure drop of ten feet. As the valve closed, the pressure drop across the valve had changed from 10% to 100%, as illustrated in Fig. 5. The basic hydraulic formula, $V^2 = 2K^2gh$, tells us that for every four times that the head is increased, the velocity or flow is doubled. However, as the valve closes to reduce the flow, the pressure across the valve increases and partially counteracts the intent of the valve action.

When the pressure drop across the valve changes, as illustrated in Fig. 6, it loses its linear characteristics. As previously stated, a 100% pressure drop across the control valve will give the result that the valve designer intended. However, 100% is not a practical figure as the greater the pressure drop across the valve becomes, the less will be effect of changing flow: therefore, 50% initial drop is recommended for a two-way water valve and must be taken into account in figuring pump specifications at the time of design.

Up to now, all discussion has been based on an assumed constant supply pressure. Such is not the case when water is circulated through the system by a centrifugal pump. Fig. 7 charts a typical hot water circulator performance curve. Note that as the flow is reduced in the system, due to the closing of the valve, the head

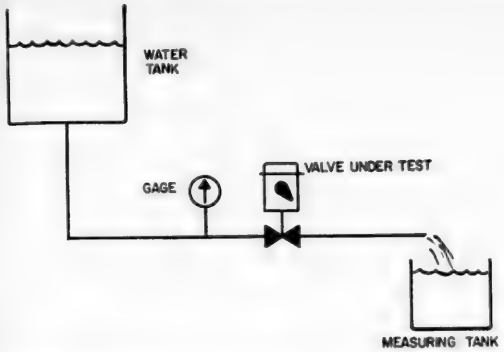


Fig. 2. Testing procedure for control valve.

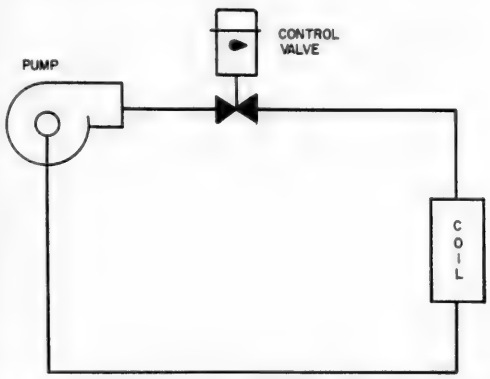


Fig. 3. System employing control valve to vary flow.

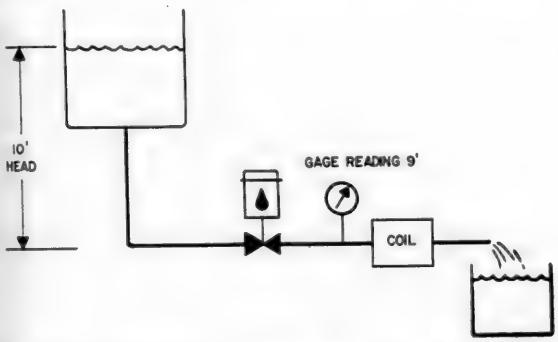


Fig. 4. Equivalent circuit, valve controlling flow to a coil, 10% pressure drop across valve at full flow.

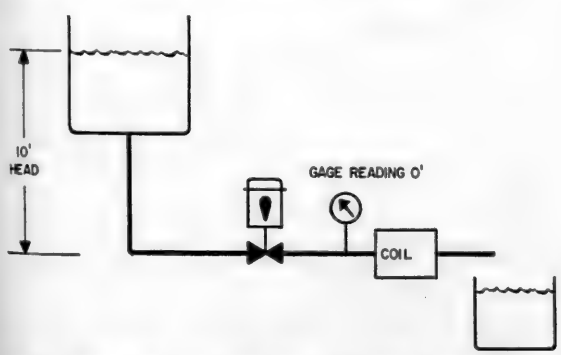


Fig. 5. Equivalent circuit, valve controlling flow to coil, 100% pressure drop across valve at zero flow.

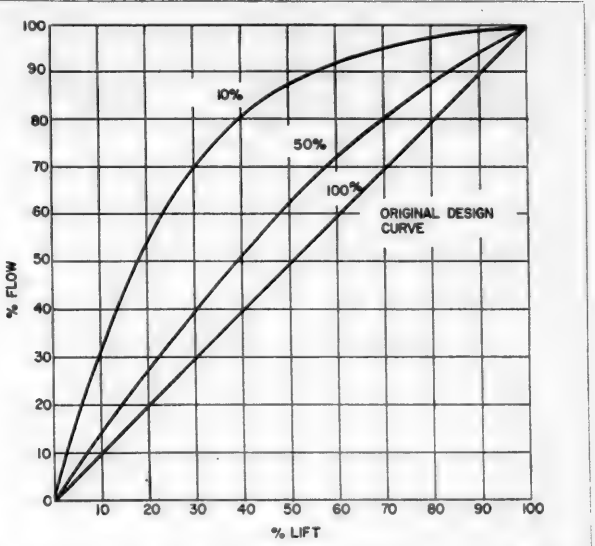


Fig. 6. Curves of per cent flow against per cent lift, for valve operating at various percentages of total system pressure drop.

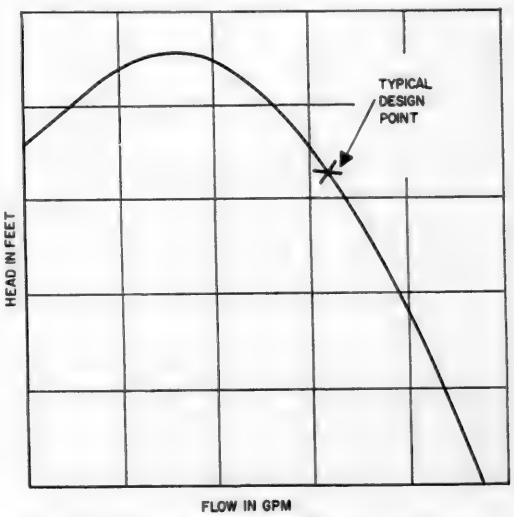


Fig. 7. Typical centrifugal circulator curve.

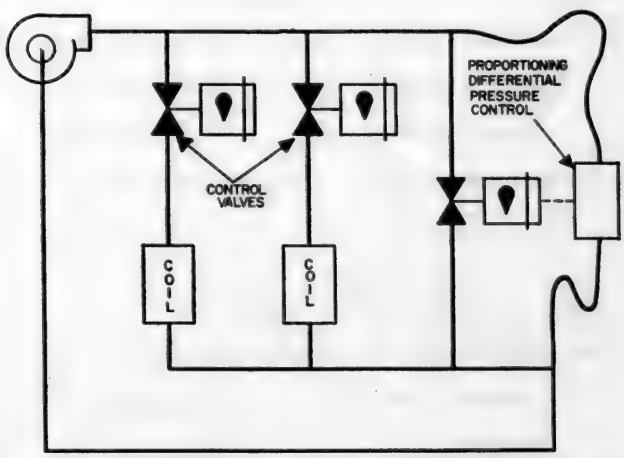


Fig. 8. Pump pressure controlled by maintaining constant flow in supply and return headers.

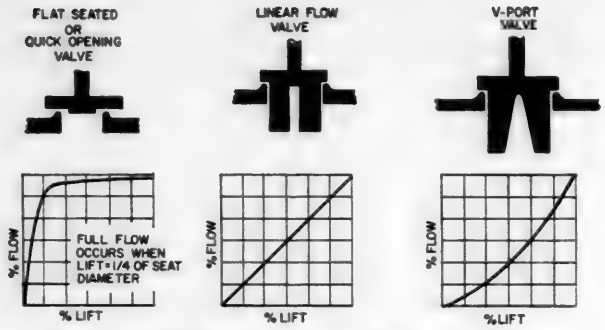


Fig. 9. Typical control valve.

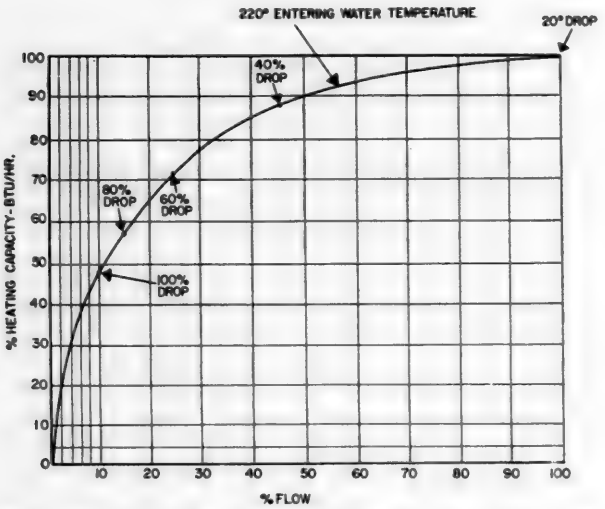


Fig. 10. Capacity-flow characteristics of a hot water heating element.

developed by the pump increases. This increase in pump pressure likewise has an adverse effect on the control of the system as it partially offsets the action in closing the control valve. How much the pump pressure increase will be depends on where the system design curve crosses the pump curve. On large applications, where high head pumps are used, it may become necessary to regulate the pump head with a control valve as shown in Fig. 8. The pressure control valve maintains a constant pressure in the headers by opening the by-pass line as the control valve closes. Thus if the pump delivery is held constant, the pump supply pressure will also be constant.

The change in pressure drop across the valve, as it closes, plus the many variations in supply pressure, requires a characterized valve if it is to give a resultant linear flow change with the many variations in valve position. Fig. 9 shows various types of control valves and their characteristics. The V-ported valve helps to compensate for some of the system variations such as changes in pump pressures and in valve pressure drop.

When using hot water as the heating medium, the problems of coil characteristics must be taken into consideration, because the heat output is not linearly related to flow.

The curve in Fig. 10 illustrates the point well. Probably the most apparent reason for this reaction lies in the fact that most hot water systems are designed around a 20-deg temperature drop; 220-deg water returning to the boiler at 200 deg still has a very large heat potential, and actually has only given up 20/150 or 13% of its available heat, based on a 70-deg entering air temperature. But piping is often oversized because of allowances for safety, etc., so that an average system may drop the temperature only 10 deg due to volume of water flow being greater than calculated. Thus only 6.5% of the total heat will be extracted from the water before returning to the boiler. This water, with its very large heat potential, resists all efforts to reduce its heat output. Any reduction in flow results in a greater temperature drop as the water remains in the coils for a longer period of time. The increase in temperature drop virtually cancels the effect of reducing the flow. If it were not for the fact that the average coil temperature drops as the differential across the coil increases, very little reduction would take place. Figure 11 illustrates what happens to a coil when the control valve reduces the flow. Notice that the valve does not do much until it nears the closed position. When the reduced flow reaches a certain point,

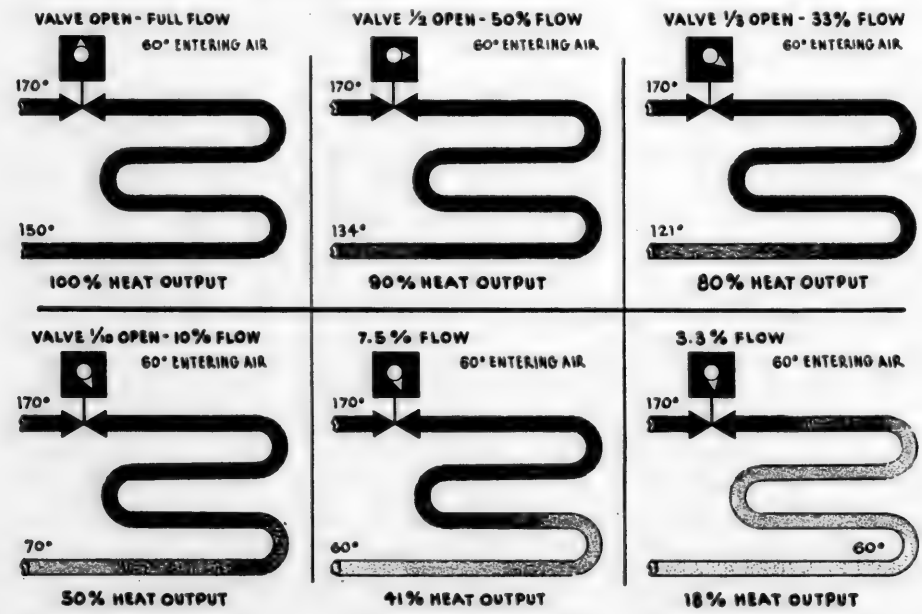


Fig. 11. Reaction of hot water coil when flow rate is reduced.

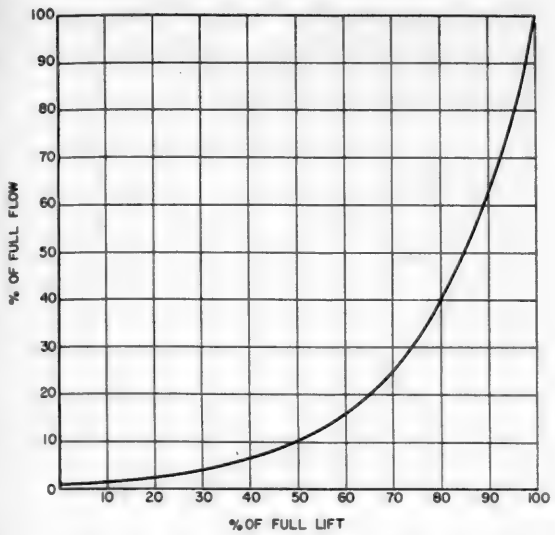


Fig. 12. Ideal equal percentage valve; 100:1 turn down.

where the temperature of the water leaving the coil is equal to the entering air temperature, then the heat output will be directly related to flow because the temperature drop can no longer increase.

By selecting a higher temperature drop in the initial design the situation discussed above can be improved. In choosing a higher drop, the potential of the system is lowered and the water will more readily reach entering air temperature. Drops up to 60 deg have become quite widely accepted. These greater temperature drops are accomplished by adding more resistance to flow into the system than would normally be used for a 20-deg drop. The additional resistance can be added in the form of a control valve which will then become the major restriction, instead of the coil and piping in the system. In doing so, the pressure drop across the valve will be high compared to the coil and pipe, and the adverse effect due to changing pressure drops across the valve will virtually be eliminated.

For example, assume a system that requires 20 gpm at a 20-deg drop to carry the load (this is 200,000 Btu per hr) and that system loss, at 20 gpm, is 5.1 ft of which 10% is the control valve. This means that the valve loss is 0.5 ft and the systems loss is 4.6 ft. Now then, 20 gpm at a 0.5-ft drop would require a 1½-inch valve. If the system is designed around a 60-deg drop to get 200,000 Btu per hr, 6.6 gpm would have to be circulated instead of 20 gpm required for a 20-deg drop, and 6.6 gpm, using the same pump, means the total resistance to flow must be 7.2 ft. The coil and system resistance at the lower flow of 6.6 gpm will be $6.6/20 = (X/5.1)^{1/2}$, which is 0.6 ft. Therefore, the control valve must handle the 6.6 gpm at a drop equal to (7.2 — 0.6) or 6.6 ft. This is equivalent to a ½-inch valve. The pressure drop across the valve would be 6.6/7.2 or 91.5%. Thus by using the same size pump and a smaller valve, it is possible to design around a 60-deg drop, which greatly improves the coil response curve and makes it more linearly related to flow. At the same time, it is possible to give the valve the major pressure drop to maintain its flow characteristics. But note: it is necessary to select a coil with enough face area to give the full 200,000 Btu per hr. The coil should give a minimum amount of stratification across the face with 60-deg drop, which can be accomplished through proper coil circuiting design.

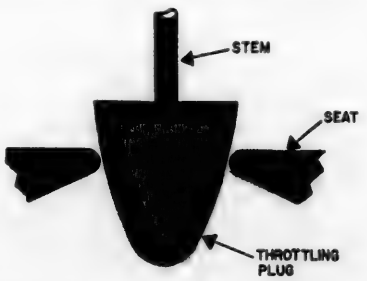
The remaining portion of the coil curve can be straightened out by selecting a valve that is characterized to a greater degree than is the V-port valve. Such a valve is known as an equal percentage port valve. Its plug is shaped so that the flow varies as the square root of the lift. A typical curve is shown in Fig. 12. A valve of this type, requiring a valve body and operator that has a long stroke, is otherwise known as a high lift valve. Valves and operators, whose stroke is less than ½ inch, cannot be characterized to the degree that is required for equal percentage.

By allowing a high pressure drop for the control valve, regulating the pump pressure, designing around higher temperature drops, and using equal percentage port valves, a reasonably linear system heat output curve can be obtained.

One of the major problems involving hot water is the matter of the system's control range curve. Due to the fact that a control system can deliver maximum available heat, or turn off the flow entirely, it is falsely assumed that the control can continuously vary the heat output from zero to maximum flow. Yet this is not the case when valves are applied as control devices. They will shut off the flow entirely when the disc is compressed against the valve seat, but are not capable of reducing the flow below a certain per cent of maximum. How much a valve can reduce the flow is called its turndown ratio, or ratio, of maximum to minimum flow. For example, if a valve has a turndown ratio of 10 to 1, flow can be reduced to 10% of its maximum flow. Below that, any change in its stem position will have little effect on its flow until the valve is shut off tight.

Clearance between the plug and the valve seat determines the minimum flow in designing a valve. The ideal design for a plug would be one that continuously increases in diameter until it wedges into the seat for complete shut-off, as illustrated in Fig. 13. A valve of this

Fig. 13. Ideal control valve.



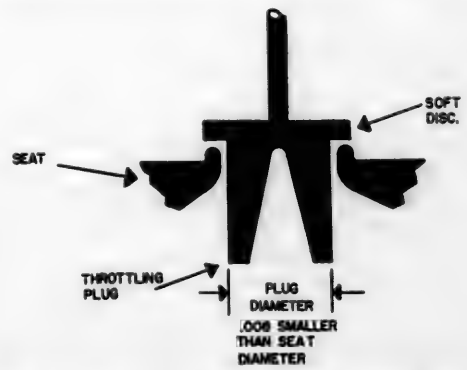


Fig. 14. Typical air conditioning control valve.

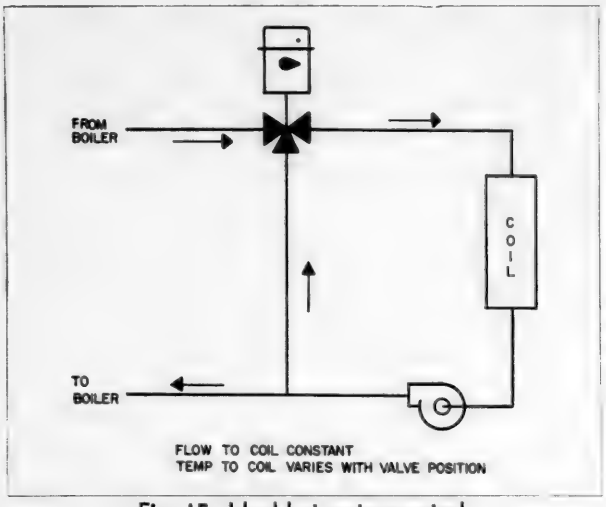


Fig. 15. Ideal hot water control.

design would require extreme force to loosen the plug. Any distortion of the seat, due to unequal expansion from temperature changes or by over-tightening connecting piping, would result in a valve that might either become stuck in the closed position or would not close tightly. Thus a throttling plug of this design would be too vulnerable and would not be suitable for air-conditioning valves.

A throttling plug that will not be affected by normal operating conditions and that can be manufactured to high commercial tolerances usually requires a clearance between the plug and seat of approximately .010 inch, as illustrated in Fig. 14. The smaller the initial valve size, the greater effect the minimum clearance of .010 inch has, because it represents a greater percentage of the full seat opening. With the trend in air conditioning towards breaking the system into more and more zones, each individually controlled, the result is the use of smaller valves and consequently the turndown ratio, discussed above, is becoming more important.

It has been said that the average air conditioning valve has a turndown ratio of about 30 to 1. However, when used in a system where the pressure drop across the valve increases as the valve closes, the higher pressure increases the flow at the minimum clearance end. The result is that the valve does not have as high a turndown ratio as it would if the pressure remained constant. Thus the average resultant turndown ratio is more in the neighborhood of 20 to 1, or a minimum flow rate of 5% of maximum.

Earlier it was established that a hot water system, with a 5% flow, will have a coil heat output of approximately 35%. Thus the minimum controllable condition on a hot water coil that is designed for a 20-deg drop with a constant supply water temperature is 35%. Below that, the valve will shut off the flow entirely. Obviously, a hot water system with a turndown ratio of 20 to 1 will not perform satisfactorily. In fact, two-position control will be the result, because the proportioning control cannot proportion the heat output below 35%. In many applications cycling in such a manner is highly unsatisfactory.

The best answer to this problem is to use a separate pump and three-way valve for each controlled coil in the system. Figure 15 illustrates such a system. Here the flow to the coil is held constant, and the temperature of the water supplying the coil is varied by changing the proportion of supply water to return water. The heat output of a hot water coil is a linear function of the supply water temperature.

Another very satisfactory solution involves use of face and by-pass dampers. It is important that they be used on systems where the same coil handles both hot- and chilled-water requirements and is oversized as far as heating is concerned. A three-way valve, changing the supply water temperature to the coil, is not satisfactory for cooling, as the higher chilled-water mixtures carried under light load conditions would result in losing all of the coil's latent effect. Under these conditions the space temperature would be satisfactory, but the humidity would be too high. Face and by-pass dampers with outdoor reset on the hot water and constant chilled water for cooling will best meet all conditions that the system must handle and produce the desired results.

Summary

In summary, if flow control valves are to be used on a hot water coil, the following recommendations should be followed: 1. Design around at least 60-deg drop; 2. Allow 50% or more pressure drop for the valve; 3. Provide pump regulation, if required; 4. Outdoor reset the hot water; 5. Use control valves that are designed for hot water, both from the standpoint of flow characterization and good turndown ratio; 6. Use a thermostat that is capable of positioning the valve in small enough increments to take advantage of the valve's characteristics.

To elaborate on point 6, a valve will function no better than the thermostat controlling it. If the valve is designed to control the flow at low values, yet the thermostat induces the valve operator to pass through its minimum flow position up to, for example, 25% open, then the value of a well-designed valve is lost. If this problem exists, the use of a stabilizing element in the discharge of the unit is the answer. The discharge element will sense the change in time to stop the valve operator before it has gone too far. Electronic controls are specifically suited to the use of discharge stabilizers as well as dual bulb controllers, providing the bulbs can be located to sense both room (return air) and discharge temperatures. A unit ventilator, for example, is one application where control from a dual bulb thermostat is possible.

Water is an ideal control medium because its temperature can be varied to suit the application. Outdoor reset controls should be employed wherever possible. Their use relieves much of the burden from the zone controls, yet, it should never be assumed that they will accept the full control. At best they are to be considered as secondary controls. Changes in internal loading from zone to zone require the zone valve to do the major controlling. The outdoor reset control must, by necessity, be set higher than zone demands, as it must take care of the coldest zone and allow additional heat for warm-up. For this reason, the outdoor control, although very useful, does not eliminate the necessity of good design practice as outlined in the discussion of control valves. When all of these factors are taken into consideration, an air conditioning system using water as the heat-exchanging medium will provide the ultimate in performance and comfort.

LOGARITHMIC MEAN TEMPERATURE DIFFERENCE

The basic heat transfer formula is

$$Q = A\ U\ D_m$$

where Q = heat transmitted, Btu per hr
A = heat transfer surface, sq ft
U = transmission coefficient, Btu per (hr) (sq ft) (deg F), and
D_m = logarithmic mean temperature difference.

Where temperature on each side of the heat transfer surface is uniform, as in the case of heat loss through a building wall, D_m is merely the arithmetic difference in temperatures.

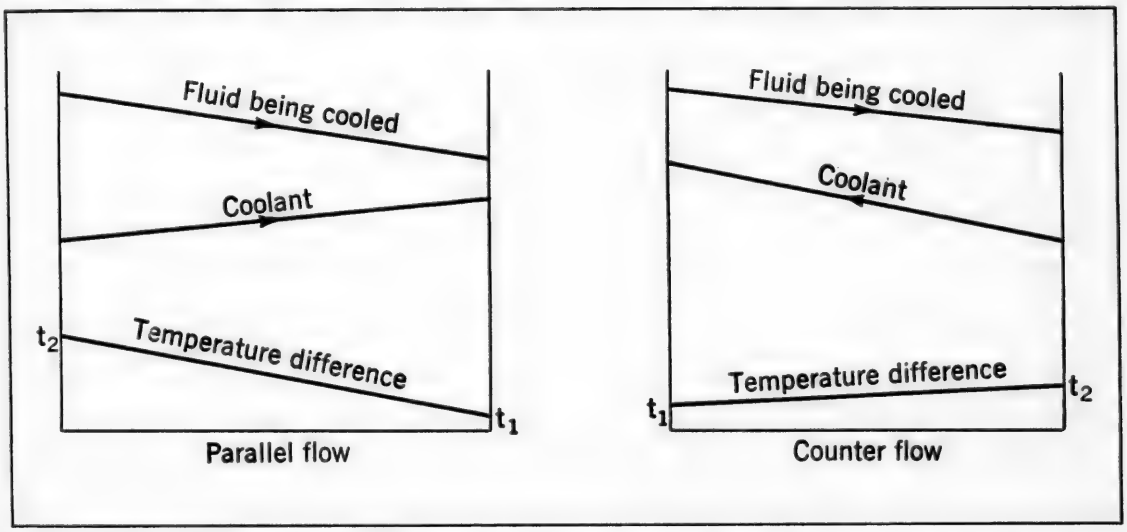
When moving fluids are involved, however, as in a shell and tube condenser, steam condenser, or liquid-to-liquid heat exchanger, there is a steadily rising temperature on one side, and a steadily falling temperature on the other. Then,

$$D_m = \frac{t_2 - t_1}{log_e\ (t_2 \div t_1)}$$

where t_2 = the larger of the two temperature differences, and
t_1 = the smaller of the two temperature differences at one or the other ends of the exchanger, as illustrated.

The tables that follow contain values of D_m for various values of t_2 and t_1. It makes no difference whether the vertical or horizontal columns are chosen for t_1.

When $t_2 - t_1$ is small, the arithmetic mean is a good approximation of the logarithmic mean. Thus, if the large temperature difference is 10, and the small temperature difference is 9, the sum of 9 and 10 divided by 2 is 9.50. The tabular value is 9.49.



Temperature relations in a heat exchanger. When heat is being extracted from a gas undergoing a change of state, the "fluid being cooled" line is horizontal.

Example:

A refrigerant vapor is liquefying in a water-cooled condenser at a temperature of 110 deg. Water enters at 75 deg, leaves at 100 deg.

A change of state takes place on the refrigerant side of the condenser, but not a change of temperature. Thus, hot gas enters at 110 deg, and hot liquid leaves at 110 deg. Water enters at 75 deg, a difference of 35 deg from the entering gas. Water leaves at 100 deg, a difference of 10 deg from the leaving hot liquid. Proceeding to the right from *35* in the first vertical column until we intersect the vertical column headed *10*, we then find that the logarithmic mean temperature difference is 19.96.

Example:

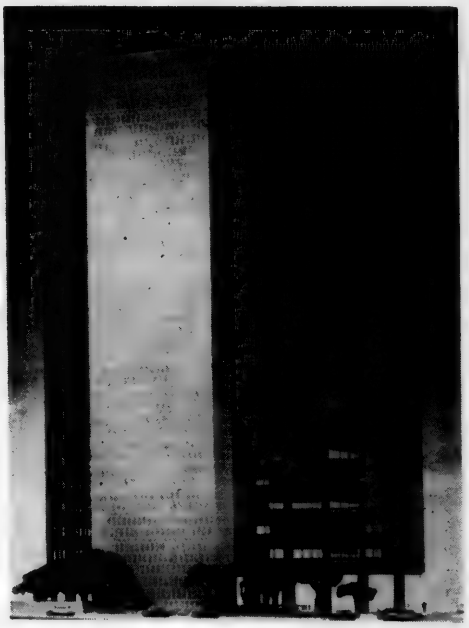
Water enters a heat exchanger at 190 deg and leaves at 178 deg. A salt solution enters in the opposite direction (counterflow) at 153 deg and leaves at 175 deg. Again we are interested in the temperature differences at the two ends of the exchanger; in this case, two inlet-outlet combinations, because of counterflow. On one end there is a temperature difference of (190 — 175), or 15 deg; on the other, a temperature difference of (178 — 153), or 25 deg. The logarithmic mean temperature difference is seen to be 19.57.

LOGARITHMIC MEAN TEMPERATURE DIFFERENCES

Temp. Diff. at One End	Temperature Difference at Other End									
	1	2	3	4	5	6	7	8	9	10
	Logarithmic Mean Temperature Difference									
1	1.00	1.44	1.82	2.16	2.49	2.79	3.08	3.37	3.64	3.91
2	1.44	2.00	2.47	2.89	3.27	3.64	3.99	4.33	4.65	4.97
3	1.82	2.47	3.00	3.48	3.92	4.33	4.72	5.10	5.46	5.81
4	2.16	2.89	3.48	4.00	4.48	4.93	5.36	5.77	6.17	6.55
5	2.49	3.27	3.92	4.48	5.00	5.49	5.94	6.38	6.81	7.21
6	2.79	3.64	4.33	4.93	5.49	6.00	6.49	6.96	7.40	7.83
7	3.08	3.99	4.72	5.36	5.94	6.49	7.00	7.49	7.96	8.41
8	3.37	4.33	5.10	5.77	6.38	6.96	7.49	8.00	8.49	8.97
9	3.64	4.65	5.46	6.17	6.81	7.40	7.96	8.49	9.00	9.49
10	3.91	4.97	5.81	6.55	7.21	7.83	8.41	8.97	9.49	10.00
11	4.17	5.28	6.16	6.92	7.61	8.25	8.86	9.42	9.98	10.49
12	4.43	5.58	6.49	7.28	8.00	8.66	9.28	9.86	10.44	10.97
13	4.68	5.88	6.82	7.64	8.37	9.05	9.69	10.30	10.89	11.44
14	4.93	6.17	7.14	7.98	8.74	9.44	10.10	10.72	11.33	11.89
15	5.17	6.45	7.46	8.32	9.10	9.82	10.50	11.14	11.74	12.33
16	5.41	6.73	7.77	8.66	9.46	10.19	10.89	11.54	12.16	12.77
17	5.65	7.01	8.07	8.99	9.81	10.56	11.27	11.94	12.58	13.19
18	5.88	7.28	8.37	9.31	10.15	10.92	11.65	12.33	12.98	13.61
19	6.11	7.55	8.67	9.63	10.49	11.28	12.02	12.72	13.38	14.02
20	6.34	7.82	8.96	9.94	10.82	11.63	12.38	13.10	13.78	14.43
21	6.57	8.08	9.25	10.25	11.15	11.97	12.74	13.47	14.17	14.83
22	6.79	8.34	9.54	10.56	11.47	12.31	13.10	13.84	14.55	15.22
23	7.02	8.60	9.82	10.86	11.80	12.65	13.45	14.20	14.92	15.61
24	7.24	8.85	10.10	11.16	12.11	12.98	13.80	14.56	15.29	15.99
25	7.46	9.11	10.38	11.46	12.43	13.31	14.14	14.92	15.66	16.37
26	7.67	9.36	10.65	11.75	12.74	13.64	14.48	15.27	16.02	16.75
27	7.88	9.61	10.92	12.05	13.05	13.96	14.82	15.62	16.38	17.12
28	8.10	9.85	11.19	12.33	13.35	14.28	15.15	15.97	16.74	17.48
29	8.32	10.10	11.46	12.62	13.65	14.60	15.48	16.31	17.09	17.85
30	8.53	10.34	11.73	12.90	13.95	14.91	15.80	16.65	17.44	18.21
31	8.74	10.58	11.99	13.19	14.25	15.22	16.13	16.98	17.79	18.56
32	8.95	10.82	12.25	13.47	14.55	15.53	16.45	17.31	18.13	18.91
33	9.15	11.06	12.51	13.74	14.84	15.84	16.77	17.64	18.47	19.26
34	9.36	11.30	12.77	14.02	15.13	16.14	17.08	17.97	18.81	19.61
35	9.56	11.53	13.03	14.29	15.41	16.44	17.40	18.29	19.14	19.96
36	9.77	11.76	13.28	14.56	15.70	16.74	17.71	18.62	19.48	20.30
37	9.97	12.00	13.53	14.83	15.99	17.04	18.02	18.94	19.81	20.64
38	10.17	12.23	13.79	15.10	16.27	17.34	18.32	19.25	20.14	20.97
39	10.37	12.56	14.04	15.37	16.55	17.63	18.63	19.70	20.46	21.31
40	10.57	12.69	14.28	15.64	16.83	17.92	18.93	19.88	20.78	21.96

(Continued on next month's Data Sheet)

Proposed Crown Zellerbach Building, San Francisco, Calif. Photo, Carrier Corporation



For centuries building walls have served both enclosure and load bearing functions. With the advent of skeleton frame construction, walls have become a skin acting essentially as an environmental filter between outdoor and indoor conditions. A research project, recently conducted to develop methods and determine economic factors for the new type of construction, gives much valuable insight into . . .

Thermal Behavior of Metal Curtain Walls

HOW important economically is the thermal behavior of metal curtain walls? What are the factors affecting the thermal behavior of this type of wall construction which has passed from the "what and why" stage to the "how and where"?

Answers to these technical questions, as well as many others not of direct importance to the air conditioning and heating industry, were sought and answered in a research project at Princeton University's School of Architecture conducted under a grant from the Committee of Stainless Steel Producers, American Iron and Steel Institute.

To ignore the thermal behavior of metal curtain walls, the sixth of six study reports begins, is to overlook what may be a critical design weakness, at least where economic values govern. The development of the use of this type of wall construction has been so rapid that contingent values have so far received only nominal attention. This condition is changing. Sufficient evidence is already at hand to indicate that control of solar heat impacts on these walls is often an economic necessity and demands attention as a requirement of good design.

Heat gain through walls accounts for only a part, usually less than a third, of the total air conditioning load in typical commercial buildings, and it makes a considerable difference whether the space concerned is near the center or the perimeter of a windowed building. It is generally recognized, however, that the wall design is the cooling load factor most amenable to reduction. As with most investigations related to building, the use of a price tag is hazardous, but for the purposes of realistic comparisons it becomes essential. Even where cost indices are chosen with care, as they have been here, it should be noted that they are more useful for comparative than for specific values.

Classification of Curtain Wall Types

For centuries building walls have served both enclosure and load bearing functions, but with the advent of skeleton frame construction the resulting "curtain wall" assumed a more restricted task. It became no longer a load carrying element, but only a "skin", and the control of the environment inside the building became its sole function. Thus in modern curtain wall construction, the wall serves essentially as an environmental filter between outdoor and indoor conditions.

Many environmental influences must be controlled for proper function of most buildings; among these are wind, water and cold. Other influences may be controlled for more efficient or comfortable function. Of these the control of heat is perhaps most difficult. This study, therefore, deals with the wall surfaces only from the standpoint of heat regulation. Since different materials have differing capacities to intercept heat impacts, the characteristics of the building skin have a decisive role in determining its thermal effect. The most important of these variations is that between the transparent window areas and the opaque solid wall areas.

Following are examples of recent designs in order to determine the several representative types which will be the basis of comparisons:

1. Completely opaque curtain wall, as illustrated by the Republic Bank, Dallas. Such a wall may in some cases entirely surround a building, leaving the interior wholly dependent upon artificial conditioning. Its low heat transmission is economically advantageous, although a fully engineered atmosphere is often considered to create psychological deficiencies.

2. Full glass window wall, as in the Lake Shore Apartments, Chicago. Appealing though they may be, the clear glass transmits to the interior most of the discomfort of external temperature variations. This treatment is regarded more as a manifestation of aesthetic principles than as an economically sound solution.

3. Wall with heat-absorbent glass, as illustrated by Lever House, New York. Such a wall intercepts a significant part of the infra-red rays without seriously affecting the amount of transmitted light. This reduces the summer cooling loads, but represents a similar loss of heating value from winter sun rays.

4. Wall with shading devices, as in the North Central High School, Indianapolis (Fig. 3). Walls like this can control or eliminate direct sun radiation, and can dissipate the obstructed heat into the outside air. Shading devices can be constructed so as not to intercept the warming rays of winter sun, and so may be designed as seasonal insulators. Further, their use adds a new element to architectural expression.

Ratio Between Opaque and Transparent Areas

Not only is the designer charged with selecting the proper materials for the wall, but he also must determine the best ratio between opaque and transparent areas. While the office buildings of the 1920's had about 25% glass area, many recent buildings have doubled this proportion of glass, and some have tripled the ratio (U.N. Secretariat 68%, Seagram Building 76%). The single window, no longer bounded by the structure, has become a window-wall. This emancipation offers a psychological sense of freedom and unrestricted vision, but at the same time, it also presents a greatly magnified heat load problem. The recognition of this fact is beginning to affect the trend toward larger glass surfaces, and in some recent buildings either a reduction of glazed area or other means of controlling the sun's heat are appearing.

It is evident that if the wall is totally opaque (solid wall without windows), the cooling tonnage will result from heat gain through the opaque surface material only. Similarly, an equivalent but totally transparent surface (full glass elevation) will require a much larger cooling tonnage resulting from the heat gain through the transparent material only. Intermediate cases, with different ratios between opaque and transparent surfaces, will require a cooling tonnage in lineal relationship with these ratios. This general relationship is shown by the equation

$$T = T_t\,(tr/100) + T_{op}\,[(1 - tr)/100]$$

where T = total required cooling tonnage

T_{op} = required cooling tonnage for 100% opaque area

T_t = required cooling tonnage for 100% transparent area

tr = transparency ratio, or percentage of transparent surface

Building Orientation

It is quite obvious that the direction a wall faces makes a considerable difference in the heat impact it receives. Figure 1 indicates the cooling tonnages which are required to offset the heat gains imposed by summer peak conditions on walls facing each of the four orientations. For each, wall values are indicated for a variety of transparent area treatments over a range of transparency ratios.

From Fig. 1 several deductions may be drawn. The ratio of transparent surface area to total wall area, excepting clear glass, 100% shaded, is seen to be a highly significant factor in cooling costs for all orientations except North. As the transparency ratio increases in the proportions of 1:2:3, the cooling load follows in approximate proportions of 1:1½:2. The use of heat-absorbent glass in the transparent areas results in a reduction of cooling loads, but even partial shading of clear glass is more effective in this respect.

In addition, the cooling load contributed by the opaque surface is shown by the trapezoidal shaded area in each of the charts of Fig. 1. It is noteworthy that this area contributes a very small proportion to the overall heat gain. More important, though, is the fact that a significant change in the U-value due to insulation does not greatly alter this relationship. The importance of the opaque areas, however, does increase along with the extent of sun control on the transparent areas. For example, when the transparency ratio is 50%, an opaque area with a U-value of 0.16 accounts for only 15% of the heat gain when unshaded clear glass is used, but contributes 50% of the heat gain when the glass is completely shaded.

Geographical Location

The amount of solar heat gain on the east, west, and north walls differs little throughout the United States, but the impact on south-facing walls varies considerably. At 30 deg North Latitude, the maximum gain through a single sheet of unshaded glass on a south wall is 49 Btu per hr. At 40 deg North Latitude, this increases to 98, and at 50 deg North Latitude it becomes 144 Btu per hr.

Generalized Cost Comparisons

Cooling costs are necessarily represented by air con-

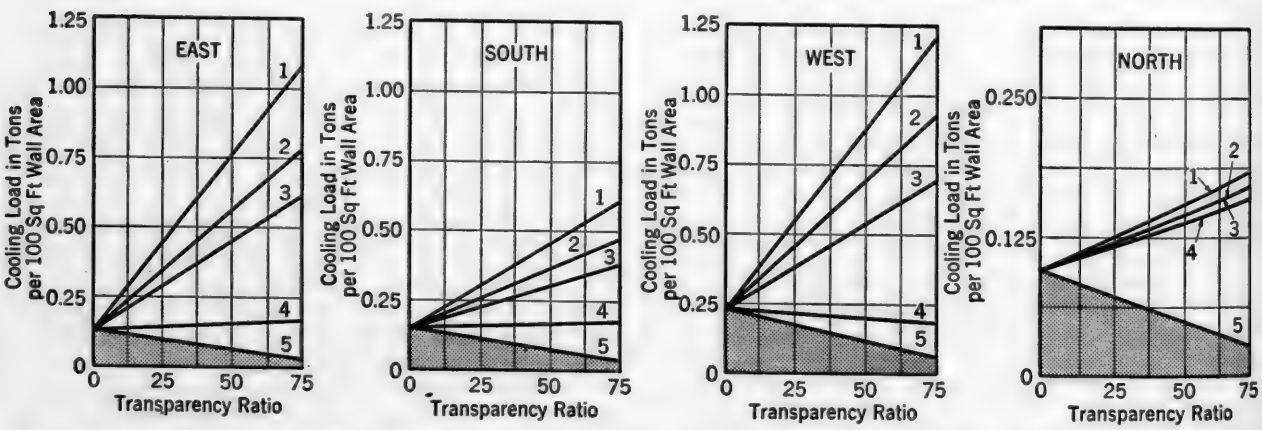


Fig. 1. Cooling load required to offset heat gain under summer peak conditions for various curtain wall arrangements facing each of the four principal orientations. 1 designates clear glass, unshaded; 2, heat absorbent glass; 3, clear glass, 50% shaded; 4, clear glass, 100% shaded; 5, opaque material, U-value of 0.13. Note that the scale has been expanded for the North orientation.

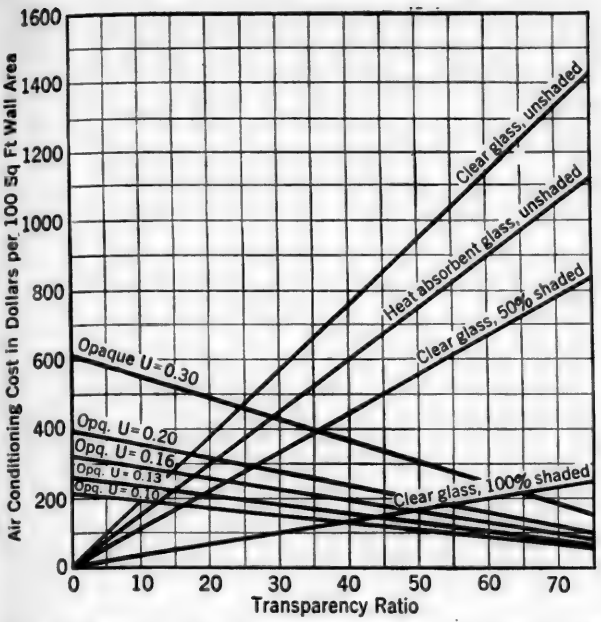


Fig. 2. Relative air conditioning costs for curtain walls under summer peak conditions based on an average of the four principal orientations.

ditioning costs. Air conditioning of course involves the control of humidity as well as temperature, but the latter accounts for such a large proportion of the cost that it is considered reasonable to regard cooling and air conditioning costs as inseparable.

Both the installation and the operational costs of air conditioning should be considered, and both vary over a wide range. As a result of investigating representative costs in connection with multi-storied buildings, it appears reasonable to use $1000 per ton as an average installation cost, and 7% of this amount, or $70 per year (per ton) as the operating cost.

Costs of installation, like other building costs, are assumed to be on the basis of "cash-in-hand," and do not customarily take into account the extra costs of financing involved by payment over an extended term. If operational costs, necessarily covering a period of years, are to be taken into account in the comparisons, it seems fair that these also be reduced to the same "cash-in-hand" basis (though this is not usually done). The term involved is assumed to be 20 years. At 5% interest, the discounted amount would be 0.623 of the total; at 4½% it would be 0.650; and at 4%, 0.680 of the total.

Using the 4½% rate, the discounted operating cost per ton for a 20-year period would be $20 \times 70 \times 0.650$, or $910. Rounding this off to $900, the total "cash-in-hand" cost of installation and 20-year operation per ton of air conditioning comes to $1900, the figure used in the following comparisons.

Figure 2 shows the relative air conditioning costs which may be expected under varying conditions of sun control, with different transparency ratios, and with a range of insulating values in the opaque areas. It is based on an average of four equal elevations facing the four main compass points, and subjected to summer peak conditions. It is important to note, in connection with this chart, that the costs read directly are for *either* the opaque *or* the transparent area; to obtain the cooling cost for any specific wall design, the two costs must be added.

For example, assume a wall having a transparency ratio of 50, unshaded clear glass, and opaque area U-value of 0.13. The cost of air conditioning each 100 square feet (over a 20-year period) will be $935 plus $130, or $1065. If a better insulated panel ($U = 0.10$) were substituted, the cost would be $935 plus $108, or $1043, a savings of $22, or 22 cents per square foot of wall. Since there are only fifty square feet of panel involved, however, any extra expenditure up to 44 cents per square foot for the extra insulation would be warranted.

If the same wall were to be fully shaded, the air conditioning cost would drop from $1065 to $435, a savings of $630. Consequently an expenditure of up to $6.30 per

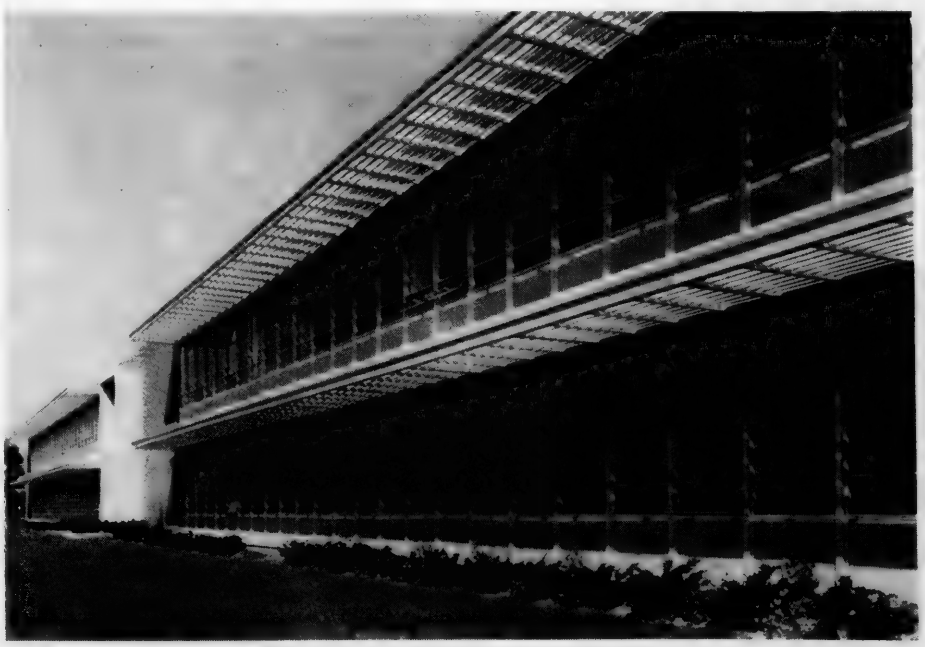


Fig. 3. Horizontal, louvered sun shades on North Central High School building, Indianapolis, Ind. Photo, O. O. McKinley Co., Inc.

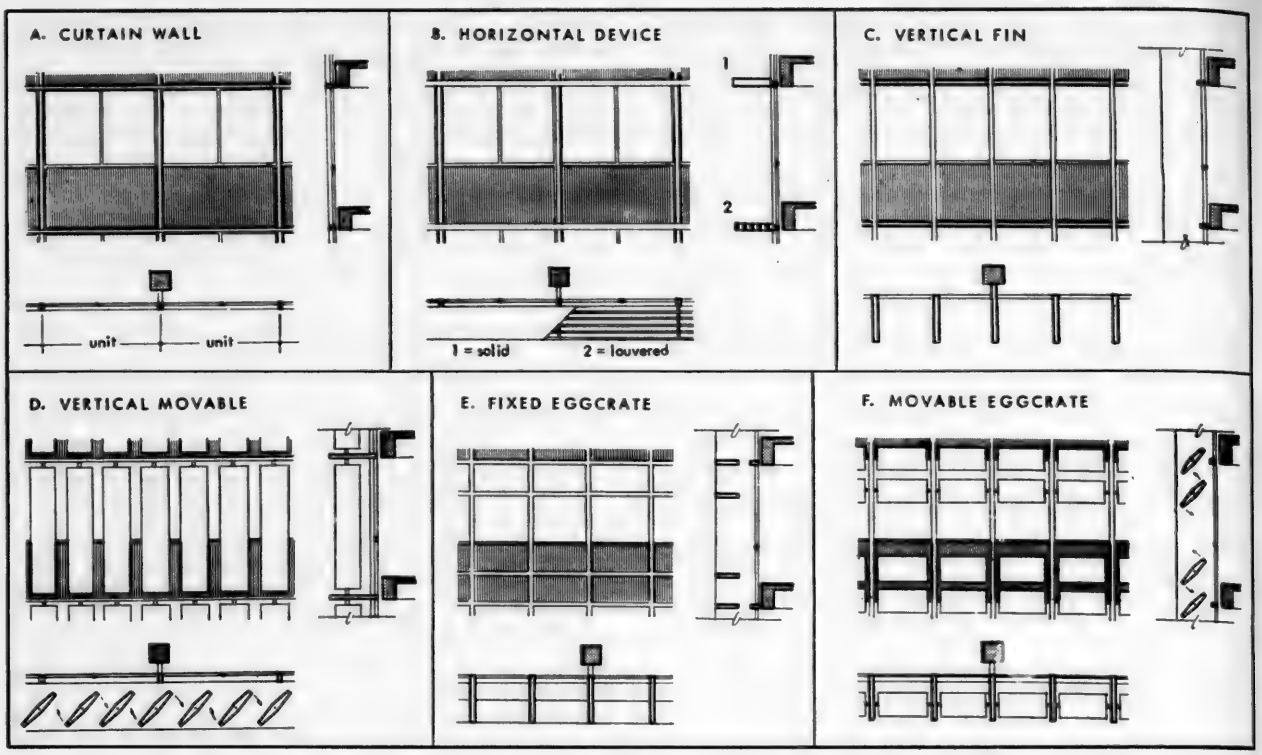


Fig. 4. Elevation, plan, and end views of typical sun-shading devices as applied to curtain wall construction. Horizontal type is also available in movable styles.

square foot for such shading would result in a net saving. If the wall were one with a transparency ratio of 75, instead of 50, the savings resulting from complete shading would be more than doubled, amounting to about $13.20 per square foot.

The data of this chart can be used as a cost yardstick in connection with preliminary design. It shows, for example in the case of a building with a transparency ratio of 60, that in place of using clear unshaded glass,, one can afford to spend an extra $2.35 per square foot for heat absorbent glass, or $4.65 for half-shading, or $8.80 for full shading for the same 20-year cost of air conditioning. If these alternatives cost less than the respective amounts, they will produce net savings. In analyzing costs for a specific case, however, it is often advisable to consider each wall separately.

Comparing the economies to be achieved by insulation of the opaque area and by shading of the transparent area, it is obvious that the latter offers a much greater return and so should receive first consideration.

Design of Shading Devices

Any well-designed shading device has inherent advantages over other methods of sun heat control because of its flexible action. Its insulating value can change according to the position of the sun so that it may serve as a barrier to summer heat rays, yet not interrupt the welcome heat of winter sun. Thus it may act as a valuable balance in the achievement of economical year-round comfort.

Proper design of the shading device is most important if it is to function correctly, and the proportion of protection provided is a reasonable measure of efficiency. However, there are two essentials to be considered:

1. the amount of protection at summer peak conditions (determining the cooling capacity and hence the initial cost of the cooling equipment).

2. the amount of overall protection throughout the cooling season (determining the annual operating cost).

Only if both these needs are satisfied can the design of the shading device be termed efficient. With an inefficient design the anticipated economies will not be realized.

Types of Shading Devices

Figure 4 illustrates schematically a variety of standard shading devices. The typical curtain wall (A) is included simply for the purpose of comparison with the five methods of shading illustrated. Principal factors affecting the cost of metal curtain wall construction are the size of the module and the number of operable windows. Large units are usually more economical per square foot, and operable window units always increase the cost appreciably. The average cost of typical walls with fixed glass is from $4.00 to $6.00 per square foot, and the use of average ventilating sash adds approximately $1.00 per sash to this cost.

Data obtained from a leading manufacturer offer a reliable indication as to the usual costs of the various shading devices. The cost of fixed horizontal shading such as type B-1 in Fig. 4 is usually from $1.50 to $2.00 per square foot of wall surface, while the louvered type, B-2, costs from $2.50 to $3.00. Fixed vertical devices (C) cost from $2.50 to $3.50, on the same basis, and the movable devices of type D will add from $8.50 to $12.00 to the square foot cost of the wall. Shading devices of the fixed eggcrate type (E) will cost between $4.50 and $6.50 per square foot of wall area; if they are movable as in type F, the cost will be approximately doubled.

Why and when we use

Air-Cooled Condensers in Hawaii

a typical semi-tropical seacoast area

FREDERICK H. KOHLOSS
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Use of air-cooled condensers is increasing in Hawaii. Reasons are given which are typical for any tropical or semi-tropical seacoast or island climate. The conditions are frankly set forth under which the cooling tower and evaporative condenser remain the engineer's choice.

MANY engineers (who are also people) live and work in Hawaii and of course in many other lands with mild climates. There is little question that industrious and ambitious work is more difficult in languorous semi-tropical areas than, for example, in a driving winter wind off Lake Erie. It is none-the-less true that engineers in Hawaii must perform engineering work reasonably efficiently to be able to earn sufficient money to enjoy living in such delightful surroundings.

As is true in the mainland United States, Hawaii's business and industry have found that increased efficiency results from air-conditioned surroundings. Even this author confesses to an air-conditioned office. Residential air conditioning is necessary for comfort only where poorly sited or improperly ventilated structures exist, and is less common than on the mainland.

The Pros Are Itemized

In Hawaii, then, comfort air conditioning is commonplace. Honolulu and other localities have many air conditioning systems and quite a few commercial refrigeration systems with air-cooled condensers. Some of the reasons designers have chosen air-cooled condensers are:

REASON	EXAMPLE
Lack of any water to spare beyond personal use;	Desert—Las Vegas, perhaps; Seattle, Washington;
Cost of power low in comparison to cost of water;	Windward shore of an ocean island, as in Kailua, Oahu;
Corrosive atmosphere;	Island or coastal location using sea water, or brackish water from shallow wells, as in downtown Honolulu;
Corrosive water;	Well water in Guam, Marianas Islands;
Hard water or water susceptible to forming deposits;	Canal Zone, Panama;
Peak weather conditions which are very humid but not excessively hot;	Single-story flat-slab supermarket roof;
Unlimited space for condensing equipment and its airflow; Inability of building structure to carry a concentrated heavy weight at desired condenser location;	Thin-shell, curved, prestressed concrete decorative drive-in restaurant roof;
Clean air but only extremely turbid water available;	Suburban Philadelphia some years ago;
Lack of suitable facilities to dispose of water bleed and periodic draining of circulating water system; and	Tenant of part of building with limited selection of condenser location; and
A high-powered salesman; whim of owner or engineer; or over-stocking.	Oops!

Honolulu, as most other American cities, has restricted use of city water for air conditioning; 6 gpm is the maximum which can be wasted in once-through condensers. Systems requiring more water must use cooling towers or evaporative condensers. Spray ponds are out of the question due to high cost of land.

Insular Design Data

Outside design conditions in common use for comfort air conditioning in Honolulu are 85 deg F d.b. and 75 deg w.b. Often, 75 deg d.b. and 50% humidity is specified for inside. Local code requires no higher than 76 deg d.b. and 66 deg w.b. inside, except for occupancies under 40 minutes, as drug stores, where 78 deg d.b. and 68 deg w.b. is permitted. Local regulations, with refreshing candor, require selection of evaporative condensers and cooling towers to be made with not less than 78-deg w.b. entering air assumed, although such condition is extremely rare, somewhat analagous to 81 or 82 deg w.b. for Baltimore in April.

It comes as no shock to anyone familiar with commercial cooling towers and evaporative condensers that many people feel some manufacturers have over-rated their equipment. One manufacturer even publishes a separate set of ratings to be used only where performance must be guaranteed. One consulting engineer, while not quarreling with ratings, has recommended that not less than 15% excess rated capacity over requirements be provided to overcome the rapid reduction in capacity resulting from the fair-to-poor typical commercial *maintenance* of evaporative condensers.

Troubles resulting from water: scale, mud, corrosion, slime, algae, leak damages, and the like, are a frank pain in the pocketbook to our industry. This is true in Hawaii as well as on the mainland, although we are spared problems related to freezing, except frosting of refrigerator coils, doors, and the like.

Honolulu Has Never Topped 90 Degrees

Is the air-cooled condenser a cure-all for condensing problems? Obviously not. Its use is increasing, however, and rightly, for in certain applications the air-cooled condenser has no equal. Conversely, it is the worst possible choice in other situations. Logically, the

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air-cooled condenser is in a favorable position in tropical climes, compared to the evaporative condenser or cooling tower, since there are no extremes in dry bulb temperature (Honolulu has never exceeded 90 deg), but wet bulb temperature is comparatively high for such a low dry bulb temperature.

It is reasonably conservative, in Honolulu weather, to select air-cooled condensers for a 110-deg condensing temperature, based on 85-deg entering air. These conditions compare favorably with the code requirements for 78 deg w.b. and the usual selection of a 105-deg condensing temperature for towers and evaporative condensers, which indicates a very favorable condition for the air-cooled condenser, up to about, say, 100 tons.

There is sufficient application experience with several manufacturers' equipment in Hawaii, Guam, and other tropical ocean areas to warrant the following conclusions relative to the air-cooled condenser for systems up to the economic tonnage limit for reciprocating compressors:

(1) Units of well-known manufacturers perform in accordance with their ratings, even when in direct tropical sunlight;
(2) Commercial air-cooled condensers are no noisier than evaporative condensers or cooling towers, even in large-tonnage systems;
(3) When selected with due care, air-cooled condensers result in equal or, at most, about 5 to 7% higher first cost than recirculated water condensing systems;
(4) Where there are no full-time maintenance personnel, systems with air-cooled condensers result in lower maintenance cost than other systems, and suffer less capacity decrease from poor maintenance;
(5) Aluminum fins on copper coils should be avoided where there is salt air. Excessive corrosion of fins is the only apparent weakness of units here.

Two Systems—Two Solutions

Two air-conditioning systems recently designed in the author's office may illustrate factors entering into selection of air-cooled condensers:

One, a 20-ton system for a single-story branch bank in a small town, is located where the sea breeze hits the building. An equipment room is directly below the optimum condenser location. This Refrigerant-12 system has an air-cooled condenser for the following reasons: Clean air, salt in the air, expensive water, long design life of better-than-average building, sufficient space, short piping obviating desirability of using tower and water cooled condenser, reasonable power cost. Selection was based on 105-deg condensing temperature with 85-deg inlet air, which is a little more conservative than typical due to desire for low operating cost.

The other job is a 90-ton combined system for a 3-story city clinic building and its new addition. Here one basement equipment room houses replacement (40-ton) equipment for a 17-year-old system, while a penthouse with a 50-ton system serves the addition. This system has shell-and-tube water-cooled condensers and a mechanical draft cooling tower for the following reasons: long piping, average power and water cost balance, long design life where operating expense is a factor, location on leeward side of island with reasonably clean and not too salty air, somewhat restricted roof area available. Selection was based on 105-deg condensing, 3 gpm per ton condensing water, 78-deg w.b. entering air, 7-deg w.b. depression, and .001 fouling factor in condensers.

Coil-Fin Corrosion is a Problem

In areas where corrosion is severe, the application engineer has limited choice of material in common commercial equipment. Of course, manufacturers must design to meet their major sales market and must be competitive in price. This tends to lead to poor resistance to corrosion. If the salt-spray corrosion-resistance tests by the Army's Engineer Research and Development Laboratories on coils (reported in *Refrigerating Engineering*, January, 1957, by H. Graus) continue to confirm tentative present conclusions, pressure will increase from military procurement and other sources to have manufacturers produce larger anodized all-aluminum coils. Until all-aluminum large-tonnage air-cooled condensers are available, extreme resistance to corrosion at a reasonable cost is difficult, but the following materials of construction are suggested:

Coil—Copper tubing hydraulically expanded into copper fins spaced up to 14 per inch;

Propeller Fan—Impeller and shaft stainless steel with prelubricated sealed bearings;

Motor—Totally enclosed prelubricated sealed bearings;

Belts—Protected from sunlight;

Frame, casing, fasteners—Galvanized steel;

Exterior finish—Plastic resin enamel; and

No aluminum in connection with dissimilar metals.

Air-cooled condenser application in tropical ocean areas requires no control of head pressure, due to even climate. Operation at a high load factor year-around justifies careful selection for low operating cost. Avoiding location with air flow against prevailing winds is essential for power saving due to the relatively high average wind velocity and relatively steady wind direction. Occasional sultry calm for periods up to a week make use of natural draft towers a doubtful economy.

Evaporative condensers and cooling towers still appear to have a large field of usefulness, the evaporative cooling effect of the "shower" contributing to much more efficient use of transfer surface. The low fluid-conveying and maintaining costs of air cooled surface make the "tradewind" of the air-cooled condenser an important factor in tropic areas. Thus, the "tradewind" follows the "shower," as it has in Hawaii for all the years in the past, but perhaps in this discussion somewhat differently than in the heart of old Hawaii. Aloha!

AIR CONDITIONING, HEATING and VENTILATING'S

REFERENCE SECTION

FEBRUARY, 1958

Design Data for Service Steam

FRED M. REITER

Design data on the use of service steam in commercial and industrial buildings

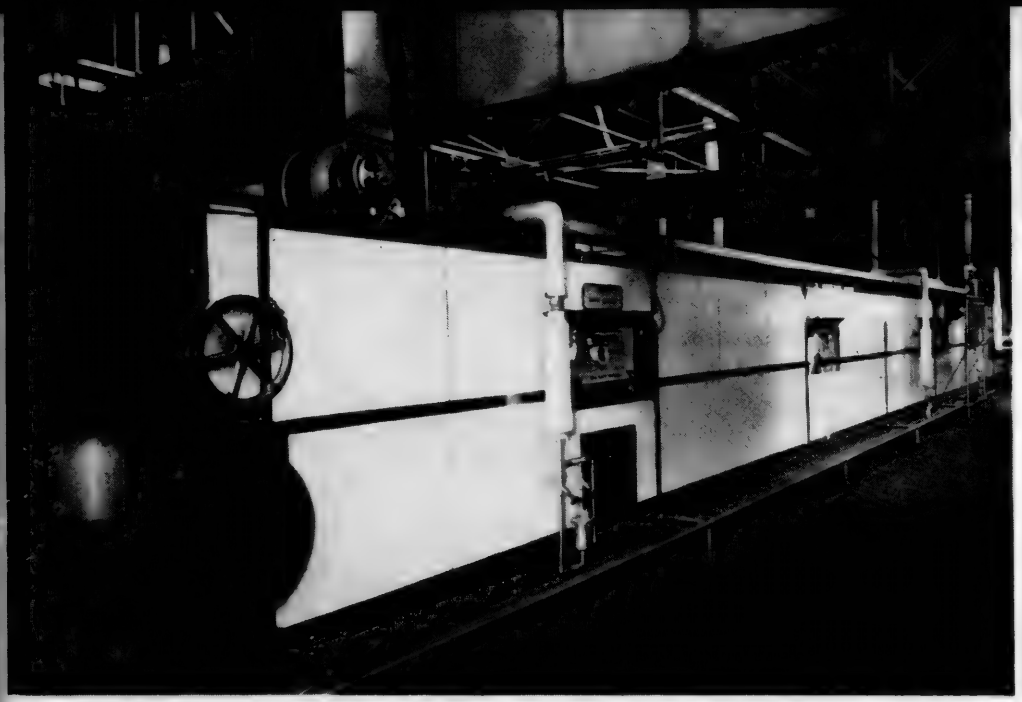


Fig. 1. Steam inlet piping for a continuous horizontal conveyor type baking oven. Photograph, Armstrong Machine Works.

Design Data for Service Steam

FRED M. REITER

Steam is widely used in commercial and industrial buildings for space heating and also for the generation of service hot water. In industrial buildings it also serves many commercial applications and industrial processes. A number of tables and information are presented to help the design engineer obtain a better understanding of service steam.

SERVICE steam is widely used in industry. There are countless processes that depend on steam for a variety of purposes, and it is only possible to cover a few in this article. Large amounts of steam are produced for power generation, oil refining, and the manufacture of chemicals but this field of steam use is not included.

A comprehensive list of typically common commercial and industrial operations, as a guide in estimating steam requirements, is given in Table 1. The figures given in this table are basically in terms of boiler horsepower recommended for supplying the steam needed for the various machines. The net steam consumption of the appliances in the tabulation is estimated, based upon average allowances for line, condensate and other losses that occur between the boiler and the device. These losses increase as the demand is smaller and more intermittent, as follows:

Demand less than 1 boiler horsepower, 25% loss from boilers

Demand from 1 to 5 boiler horsepower, 15% loss from boilers

Demand over 5 boiler horsepower, 10% loss from boilers.

This variation in losses is based upon the fact that small appliances have greater relative lengths of uncovered pipe of smaller diameter. Their ratio of exposed surface to their inside flow capacity is greatest. Operations are less efficient from the viewpoint of steam conservation.

The base of this tabulation is 34.5 lb of standard steam from and at 212 deg F per boiler horsepower. For higher steam pressures and superheats, this weight is reduced in proportion to the factor of evaporation. For simplicity, for use with smaller individual appliances generally distantly located from the boilers or district steam entry, direct total heat values above 32 deg (saturated steam values) are correlated. Table 2 gives these adjustment factors. Feed water temperatures, steam wetness or superheat are omitted. Dry steam of higher temperatures and pressures would reduce the actual weight of steam needed for the same heat requirements.

Table 3 gives the basic temperatures normally used in an illustrative operation for drying various industrial products. One of the most common industrial uses of steam is for heating baths of acid pickling, caustic cleansing, plating and other solutions along with the accompanying tanks of rinse water.

Time Factor

Even in the large continuous conveyor systems that seem to carry tons of metal fenders or parts, the steam requirements are dictated by the volume of water or solution that must be raised to operating temperature

TABLE 1.—STEAM CONSUMPTION OF TYPICAL COMMERICAL AND INDUSTRIAL PROCESSES

Process	Lb Steam per Hour or per Unit	Boiler Horse Power
Bakeries		
Dough room trough, 8 feet long	3.6	0.13
Proof boxes, 500 cu ft capacity	7.1	0.25
Ovens:		
Peel or dutch type		
White bread, 120 sq ft surface	29.3	1.0
Rye bread, 10 sq ft surface	58.6	2.0
Master baker ovens	29.3	1.0
Century reel, W/PB per 100 lb bread	29.3	1.0
Peterson reel, W/PB per 100 lb bread	29.3	1.0
Rotary ovens, per deck	29.3	1.0
Bennett 400, single deck	44.0	1.5
Hubbard, any size	58.6	2.0
Middleby-Marshall, W/PB	58.6	2.0
Baker-Perkins travel ovens		
Long tray, per 100 lb bread	13.0	0.5
Short tray, per 100 lb bread	29.3	1.0
General Electric	20.1	0.75
Fish duothermic rotary, per deck	58.6	2.0
Revolving ovens		
8-10 bun pan	29.3	1.0
12-18 bun pan	58.6	2.0
18-28 bun pan	87.9	3.0
Bottle Washing		
Soft drink, beer, etc., per 100 bottles per minute	310	10.0
Milk quarts, per 100 cases per hour per dozen bottles per minute	58.6	2.0
Bill Board Paste		
Per 50 gal batch per hour, approx. BHP varies inversely as time.	58.6	2.0
Candy and Chocolate		
Candy cooking, 30 gal cooker, 1 hr 325 deg	46.9	1.6
Chocolate melting, jacketed, 24-inch dia	29.3	1.0
Chocolate dip kettles, per 10 sq ft tank surface	29.3	1.0
Chocolate tempering, tops mixing, each 20 sq ft active surface	29.3	1.0
Creameries and Dairies		
Milk can be figured as water on volume basis		
Creamery cans, per 3 per minute	310	10.0
Pasteurizer, per 100 gal heated 20 minutes	232.5	7.5
Dish Washers		
2-compartment, tub type	58.6	2.0
Large conveyor or roller type	58.6	2.0
Autosan, Colt, depending upon size	29.3-117.2	1- 4
Champion, depending on size	58.6-310	2-10
Hobart Crescent, depending on size	29.3-186	1- 6
Fan spray, depending on size	58.6-248	2- 8
Garbage Cooking		
Per ton of garbage cooked 30 min.	248	8
Hospital Equipment		
Stills, per 100 gal distilled water	102.6	3.5
Sterilizers, bed pan	2.9	0.1
Sterilizers dressing, per 10-inch length, approx.	7.1	0.25
Sterilizers instrument, per 100 cubic inch, approx.	2.9	0.1
Sterilizers water, per 10 gal water, approx.	5.8	0.2
Disinfecting ovens, double door		
Up to 50 cu ft per 10 cu ft, approx.	29.3	1.0
50 to 100 cu ft per 10 cu ft, approx	21.6	0.8
100 and up, per 10 cu ft, approx.	16.0	0.6
Laundry Equipment		
Vacuum stills, per 10 gal	16.0	0.6
Spotting board, trouser stretcher	29.3	1.0
Dress finisher, overcoat shaper, each	58.6	2.0
Steam vacuum finishing board	58.6	2.0
Jacket finisher, Susie Q, each	44.0	1.5
Air vacuum finishing board, 18-inch mushroom topper, each	20.1	0.75
Steam irons, each	4.3	0.16
Flat work ironers:		
48-inch x 120-inch, 1-cylinder	248	8.0
48-inch x 120-inch, 2-cylinder	310	10.0
4 roll, 100 to 120-inch	217	7.0
6 roll, 100 to 120-inch	341	11.0
8 roll, 100 to 120-inch	465	15.0
Shirt equipment		
Single cuff, neckband, yoke, No. 3, each	7.1	0.25
Double sleeve	13.0	0.50
Body	29.3	1.0
Bosom	44.0	1.5
Dry rooms: blanket	20.1	0.75
Conveyor, per loop, approx.	7.1	0.25
Truck, per door, approx.	58.6	2.0
Curtain, 50 x 114	29.3	1.0
Curtain, 64 x 130	58.6	2.0
Starch, cooker, per 10 gal capacity	7.5	0.26
Starcher, per 10-inch length, approx.	5.2	0.2
Laundry presses, per 10-inch length, approx.	7.1	0.25
Handy irons, per 10-inch length, approx.	5.2	0.2
Collar equipment: collar and cuff ironer	21.6	0.8
Deodorizer	87.9	3.0
Wind whip, single	58.6	2.0
Wind whip, double	87.9	3.0
Tumblers, general usage, other source		
36-inch, per 10-inch length, approx.	29.3	1.0
40-inch, per 10-inch length, approx.	38.1	1.3
42-inch, per 10-inch length, approx.	52.7	1.8
Silver Mirroring		
Average steam tables	102.6	3.5
Tire Shops		
American, Bacon, Lodi machines		
Truck molds, large	87.9	3.0
Truck molds, medium	58.6	2.0
Passenger molds	29.3	1.0
Sections, per section	7.1	0.25
Puff irons, each	7.1	0.25
Tumblers		
Huebsch, 36-inch, per 12-inch length	29.3	1.0
Vorcone, 42-inch, per 15-inch length	44.0	1.5
Vorcone, 30-inch x 40-inch	73.3	2.5
Vorcone, 46-inch x 120-inch	310	10.0
Presses, central vacuum, 42-inch	20.1	0.75
Presses, steam, 42-inch	29.3	1.0
Plastic Molding		
Each 12 to 15 sq ft platen surface	29.3	1.0
Paper Manufacture		
Corrugators, per 1000 sq ft	29.3	1.0
Wood pulp paper, per 100 lb paper	372	12.0
Restaurant Equipment		
Standard steam tables, per foot length	36.6	1.25
Standard steam tables, per 20 sq ft tank	29.3	1.0
Bain Marie, per ft length, 30-inches wide	13.0	0.5
Bain Marie, per 10 sq ft tank	29.3	1.0
Coffee urns, per 10 gal, cold make-up	13.0	0.5

Process	Lb Steam per Hour or per Unit	Boiler Horse Power
Restaurant Equipment (Continued)		
3-compartment egg boiler	13.0	0.5
Oyster steamers	13.0	0.5
Clam or lobster steamer	29.3	1.0
Steam jacketed kettles		
10 gal capacity	13.0	0.5
25 gal stock kettle	29.3	1.0
40 gal stock kettle	44.0	1.5
60 gal stock kettle	58.6	2.0
Plate and dish warmers		
Per 100 sq ft shelf	58.6	2.0
Per 20 cu ft shelf	29.3	1.0
Warming ovens, per 20 cu ft	29.3	1.0
Direct vegetable steamer, per compartment	29.3	1.0
Potato steamer	29.3	1.0
Morandi Proctor, 30 comp., no return	87.9	3.0
Pot sink steam jets, average use	29.3	1.0
Silver burnishers, Tahara	58.6	2.0

in one hour or in the time set up by the industrial engineers. This is the demand or capacity load. The work load after heat-up will then comprise the bulk of steam consumption during the working day.

The time factor is vital to figuring the steam or boiler load. Table 4 illustrates the halving of the steam demand in doubling the time of cooking in steam jacketed kettles. This table is based on the installation of the kettle not over 20 ft from the heat source and the return of condensate directly to the boiler. Heat for loss due to radiation is included. It is the heat-up time that can be lengthened to minimize the investment in boiler and line capacities.

Steam Load and Sizing

The steam required to raise various quantities of water or solutions from 55 deg to various temperatures, in terms of boiler horsepower, can be obtained from Fig. 2. These figures are of value in estimating steam loads for kettle loads of soups, syrups, hydration of dried foods, pie fillings, chemical solutions and many other industrial purposes.

Where the heat-up time is different than the one hour allowed for information plotted in Fig. 2, it is necessary to multiply the boiler horsepower load required by the following factors:

Time, Hours	Factor	Time, Hours	Factor
0.25	4.00	2	0.50
0.5	2.00	3	0.333
0.75	1.33	4	0.250
1.0	1.00		

Figure 3 gives the suggested boiler sizes required to

TABLE 3.—NORMAL DRYING TEMPERATURES FOR INDUSTRIAL MATERIALS

Data can be used for computing circulating drying air and steam conditions.

Material	Temp. Required, Deg F	Material	Temp. Required, Deg F
Barks	80-220	Matches	140-180
Bathing suits	120-180	Macaroni	110-150
Bedding	150-190	Mattresses	100-180
Blankets	140-180	Metal parts	150-400
Cereals	110-150	Nuts	90-140
Clothes	100-180	Overalls	120-180
Drugs	80-400	Painted goods	100-200
Felt hats	140-180	Paper, glued	160-300
Feathers	150-180	Paper treated, dyed	150-200
Furs	150-190	Pasted ribbons	160-200
Glass ware	150-250	Pills	80-180
Glued tapes	160-300	Pipes for smokers	70-150
Gut	150-200	Photo prints	90-110
Hair goods	150-190	Photo negatives	90-110
Herbs	80-220	Photo films	90-110
Hops	120-180	Printing inks	70-300
Knitted fabrics	140-180	Rags	120-180
Ladies hats, glued	140-180	Shoes	100-200
Leather goods	100-200	Wagon wheels	70-160
Lumber	70-150		

Source: Surface Combustion Co., New York.

TABLE 2.—BOILER HORSEPOWER OF STEAM THAT WILL FLOW FROM VARIOUS NOZZLES

Nozzle Size		Steam Pressure, Psig					
Diameter, Inches	Area Sq In	10	30	50	70	90	100
		Boiler Horsepower Equivalent in Steam Used					
1/32	0.00076	0.04	0.07	0.10	0.13	0.16	0.18
1/16	0.0031	0.12	0.24	0.35	0.45	0.55	0.61
3/32	0.0069	0.31	0.57	0.81	1.06	1.30	1.45
1/8	0.0123	0.60	1.00	1.40	1.90	2.30	2.50
3/16	0.0276	1.20	2.20	3.20	4.20	5.20	5.70
1/4	0.0491	2.20	4.00	5.70	7.50	9.20	10.10
5/16	0.0767	3.30	6.00	8.90	11.60	14.60	15.70
3/8	0.1104	4.90	8.80	12.70	16.70	20.70	22.70
7/16	0.1503	6.50	12.00	17.30	22.70	28.10	31.00
1/2	0.1963	8.50	15.50	22.50	29.50	36.50	40.00

Based upon American Gas Association boiler data for use in estimating steam requirements and boiler capacity needed to supply steam jets.

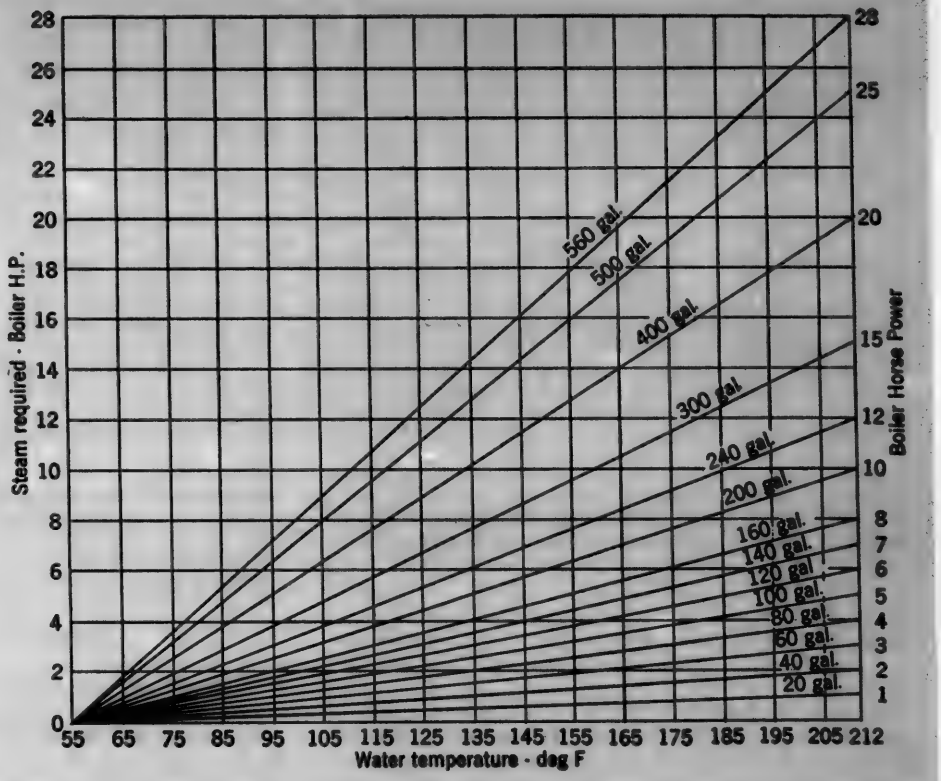


Fig. 2. Boiler sizing chart for steam jacketed kettles. Solution assumed to have same specific heat as water with installation at sea level.

maintain various tank capacities of water or water solutions at the temperatures shown. If 1 boiler horsepower is added for each ton processed, 10% for water carryover by the work and 20% for other losses, the estimate of steam needs should be obtained. If the tank is oversized for the amount of work done, the heat up-time may be excessive. From this point of view, an oversized tank is wasteful. Plenty of solution serves as a fly wheel for maintaining temperatures in case of intermittent heavy loads. Lay-outs, especially continuous types, generally supply ample volumes of water in their design, especially for continuous conveyor operations where allowance must be made for the movement of the conveying equipment. This is particularly true where light bulky stampings require disproportionately large tanks for the actual tonnage run through.

TABLE 4.—STEAM FOR JACKETED KETTLES

Steam for cooking liquids having the specific heat of water, based on water heated from a cold start to the boiling point.

Size of Kettle, Gallons	Cooking Time, Hours to Bring Contents from Cold or Room Temperature to Boiling, 212 Deg F				
	0.25	0.5	1	2	3
	Lb Steam Required per Boiler Horse Power				
10	2	1	½	¼	—
25	5	3	2	1	½
40	8	4	2	1	½
50	10	5	3	2	1
60	12	6	3	2	1
80	15	8	4	2	2
100	20	10	5	3	2
125	25	12	6	3	2
150	30	15	7	4	3

Source: Boiler bulletin, Eclipse Fuel Engineering Co.

Pipe Sizes

Refer to Table 5 for data on the size and length of pipe required for normal steam heating coils, immersed in water solutions, to raise 100 gal of water from 62 to 212 deg, a rise of 150 deg in one hour. High steam pressures increase the speed of heating, because of the higher steam temperatures and heat transfer rates and this results in less piping coil for the job. Length of time for heating is inversely proportioned to the length of pipe. As an example, for one-half hour heating time, the pipe length is twice that given in the table. Generally, the average pipe diameter is 1¼-inch. Good trapping and removal of condensate is essential to good heating.

Table 6 gives the length of pipe of various sizes supplying the same heat transfer, in terms of units of 1.0 boiler horsepower. The larger pipe has much more available surface per foot of length. Steel pipe coils smaller in size than 1-inch dia hardly pay. This also applies to unnecessarily large pipe. The average size of coil pipe normally used is 1¼-inch dia.

Table 6 also provides the steam consumed in the piping leading to the appliances, in terms of boiler horsepower for bare and covered pipe of different sizes commonly used, as well as pounds steam from and at 212 deg per 100 ft of pipe. The value of the covering is evident from the differences in the bare and covered pipe figures. The larger the pipe, the greater the condensing area per

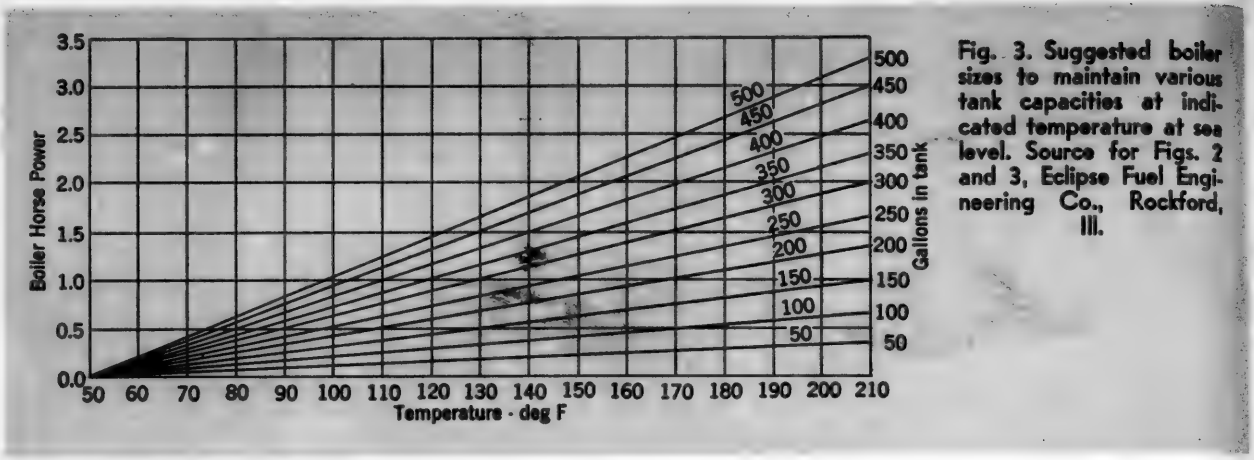


Fig. 3. Suggested boiler sizes to maintain various tank capacities at indicated temperature at sea level. Source for Figs. 2 and 3, Eclipse Fuel Engineering Co., Rockford, Ill.

TABLE 5.—PIPE LENGTH FOR STEAM HEATING COILS

Coils immersed in water solutions to heat 100 gal water from 62 to 212 deg F, in one hour at various steam pressures.

Steam Pressure, Psig	Steam Temp, Deg	Nominal Pipe Size—Inches Diameter				
		1	1¼	1½	2	2½
		Length of Pipe, Feet, in Submerged Coils to Heat 100 Gal Water From 62 to 212 Deg in 1 Hr				
3	222	45.2	34.4	29.4	23.0	19.3
10	240	24.5	18.7	16.0	12.5	10.5
25	267	17.9	13.6	11.7	9.1	7.6
50	298	13.4	10.2	8.7	6.8	5.7
100	338	9.8	7.5	6.4	5.0	4.2

Source: *Industrial Gas*, Sept. 1954, Hot Water for Large Volume Needs, Industrial Solutions, F. M. Reiter, p. 6.

foot of pipe. These figures would be altered slightly for wetness of steam. Adjustments to boiler feed water temperatures and net heat supplied for steam generation would require the use of factor of evaporation.

To convert saturated steam of various pressures and heat contents to or from boiler horse power of 34.5 lb steam at 0 psig, use Table 7. Table 8 supplies correction factors for changes in gallons per hour per square foot of pipe surface that is related to each 5 psi change in steam pressure.

Rinse tanks using water that condensed steam, will produce no dilution or ill effects. Frequently they use steam directly for heating, through jets usually in the form of venturi injectors. Injectors reduce noise and create rapid circulation; this helps to quickly distribute the heat of the steam. Steam from nozzles or jets are also used for humidification of atmospheres, reducing fire hazards around flammable materials, and many other purposes.

Table 2 gives the steam capacities of various sizes of nozzles at normal plant process pressures. At 34.5 lb per boiler horse power these figures can readily be converted to pounds of steam per hour demand or for total consumption. Corrections in weight of steam for wetness need not be made because adiabatic expansion of the high pressure steam to atmosphere will re-evaporate the moisture and superheat the steam.

DIVERSITY OF DEMAND

It would not be economical from the viewpoint of investment in boiler capacity or piping to use the sum of the demands of all individual radiators and appliances as the maximum hourly requirement of the building, department, floor or segment of the plant. It is unlikely that all units are on full steam at the same moment.

The greatest demand for steam would occur during winter mornings due to the recovery of temperatures that had been reduced during the previous night, along with regular process loads. Maximum steam use would come on Monday mornings because of week-end shut-downs. At that time the equipment is cold.

These morning peak demands can be compensated for in several ways:

1. *In industrial processes*, such as solution heating, extra hours of heat-up time before operations start, are utilized to bring solutions or equipment to temperature at the given starting time. Doubling the heat-up time halves the demand. The work load is generally much less than the steam required for heat-up.

2. *During cold nights and week-ends*, temperatures need not be reduced as low as during warm periods, so that pick-up time and peak demands are reduced.

3. *For space heating* with long feed and return lines, calculated radiation and heating capacity based upon normal design temperatures inside and outdoor, have been boosted by a percentage to give faster heat-up in the mornings. Boiler capacities and condensate returns are increased up to 25% to augment the recovery of temperatures of space and equipment, especially where night shut-off is anticipated.

Not as much diversity demand reduction can be made with steam as with hot water supply. Hot water systems have storage tank capacity built into the lay-out to cover peak demands for hot water, as a fly-wheel, yet lower the hourly input steam or fuel rate to a more constant level. Steam systems must have their demand produced as needed somewhat like an instantaneous heater without storage reserve.

Many European plants utilize steam accumulator tanks that store hot water at steam pressures and temperatures. Any drop in line pressures releases steam from the accumulator as water vaporizes from the heat stored in the water. Accumulators reduce the boiler capacity needed to meet sudden demands.

For large factories where steam equipment such as that used in restaurants, snack bars, and for personal hygiene take their loads later in the day, not during the morning peaks, diversity factors can be set up. Steam hammers in forge shops have a coincidence factor. Laundries where washers, tumblers, presses and ironers vary in the timing of their operations; bakeries and restaurants where kettles and preparation loads can be put on after the space heating peaks; and other manufacturing plants with plastic presses and other equipment varying their periods of peak demands, have a diversity factor as low as 70% of the sum of all individual unit consumptions. This figure may be used in determining the sizing of steam mains and boiler capacities.

Where steam is purchased from outside district heating utilities, heavy peak demands frequently penalize price structure. Peak demands mean greater investment to the steam supplier. Planned diversification or the staggering of loads, in the avoidance of "coincident maximums," pays off. The same thought applies to the steam plant of any large establishment.

In the normal growth of a plant that expands its capacity or widens its activities, the plant fluids such as steam, air, water and electricity—inevitably come into short supply. In many cases, a study of loads, wastes, coincident demands, leakage, more and better insulation of lines, better trapping, utilization of waste or condensate steam for hot water heating, and other savings will result in operational changes or economies that will save heavy investment in added steam supply and boiler plants. Better "diversity" will pay off.

STEAM ECONOMIES

There are a number of means for saving steam, lowering demands and consumptions, reducing investment, and operating and fuel costs.

TABLE 6.—PIPE LENGTHS EQUIVALENT TO 1 BOILER HORSE POWER

(34.5 lb steam per hour from and at 212 deg F)

Nominal Pipe Size, Inch Dia	Outside Surface Area of Pipe: Sq Ft per Lineal Foot	Internal Flow Area of Pipe, Square Inches	Lineal Ft Pipe with Heat Loss Equivalent to 1.0 Boiler Horsepower		Lb Steam from and at 212 Deg F Condensed per Ft Pipe	
			Bare	Covered 1½-inch Insul.	Bare	Covered 1½-inch Insul.
¾	0.275	0.614	260	1,000	13.5	3.5
1	0.346	0.945	200	820	17.5	4.3
1¼	0.434	1.633	160	660	22.0	5.3
1½	0.494	2.222	140	620	25.0	5.7
2	0.622	3.654	110	560	31.8	6.3
2½	0.753	5.450	90	440	38.9	8.0

Source: Basically from AGA industrial bulletins.

TABLE 7.—STEAM VALUES

Adjustment of standard steam quantities (0 psig, from and at 212 deg) for equivalent heat content, to steam at various pressures.

Steam Pressure, Psig	Steam Above 212 deg F, Total Heat, Btu per Lb	Correction Factor for Equiv. lb Steam from and at 212 Deg	Equiv. Lbs of Steam per Boiler Horse Power
0	970.4	1.000	34.5
10	980.6	0.989	34.1
20	987.1	0.984	33.9
30	992.0	0.978	33.7
40	995.9	0.974	33.6
50	999.1	0.971	33.5
60	1001.5	0.968	33.4
80	1006.2	0.964	33.3
100	1010	0.960	33.1
125	1013	0.958	33.05
150	1015	0.956	33.0

Reducing Effective Comfort Temperatures. Steam heated buildings are normally overheated. High temperatures reduce work performance. A rise from 68 deg to 75 deg might decrease this performance 15%; to 86 deg, a drop in efficiency of 28%.

At the same time, humidity raised to predetermined standards improves the quality of products and operations in many sensitive industries. Some preferred effective work conditions that give best results follows:

Industry	Dry bulb Room Temp, Deg F	Relative Humidity Per Cent
Spinning	75	65
Match production	68	55
Candy dipping	66	55

Effect of Occupancy. Reduced occupancy of buildings should be accompanied by lowered steam consumption. This implies shutting off unused areas, reducing temperatures for periods of non-occupancy and conserving steam wherever possible, with equipment and feeder lines.

Curtailing Steam at Night. The question of shutting off steam at night is an important one. As pointed out before, the total morning demand might be excessive and require excessive capacities. For industrial working areas that are used only 8 hours a day and unoccupied 16 hours a day and during week-ends, the savings are warranted.

Traps, Check Valves and Strainers Save Steam. Efficient use of steam means the complete release of the latent heat of vaporization by complete condensation within the heating equipment. Traps close off the passage of steam while permitting the condensed liquid to pass through. Control of flow is accomplished by means of buckets, floats, bellows or thermostatic valves. Traps also release collected air, expelled to the atmosphere, permit-

TABLE 8.—CHANGE IN GAL PER HR PER SQ FT PIPE SURFACE AS RELATED TO EACH 5 PSI CHANGE IN STEAM PRESSURE

Rise in Temp. of Heated Water, Deg F	Approx. Gallons Change per Hour per Sq Ft Pipe Surface		
	Copper Pipe	Brass Pipe	Steel Pipe
60	4.4	4.2	2.8
80	3.4	3.1	2.0
100	2.8	2.7	1.8
120	2.4	2.3	1.5
140	2.3	2.2	1.4

ting hot steam to fill the heating space and minimizing corrosion and scaling by internal oxidation.

It is important to select the proper type of trap, with its accompanying dirt catcher and/or strainer placed ahead of the traps to keep seats and movable parts clear. General types of traps serving their proper equipment, fall under four functional classifications as listed in Table 9.

Strainers or dirt catchers should precede all pressure reducing, regulating and automatic control valves as well as traps. They should be of ample size to keep all moving parts clear. Their brass screens are easily removed and cleaned periodically.

A check valve should be installed on the discharge side of the traps, in multiple installations, so that condensate discharge will not back up into idle units and load it with valuable boiler water. Return traps and special applications will be discussed under boilers.

Air Vents Give Capacity and Steam Circulation. Accumulated air prevents fresh steam from filling a space, reducing capacity, retarding free flow of steam and condensate. Condensed water only occupies 1/1700 of the volume of steam vapor. Free circulation of steam is vital.

There are two general categories of vents:

1. Radiator, small in size and capacity, thermostatically operated, with a float to prevent leakage of liquid condensate, some with vacuum seals that prevent air from re-entering the system.

2. Line vents that remove air from steam and return lines. They are also used on indirect radiators.

Good venting increases heating efficiencies and reduces the cost of steam and operations. This has been discussed previously.

Steam Leaks Are Expensive. Steam leaks from equipment, joints, valves and piping require immediate elimination, along with constant vigilance and maintenance. The waste of steam in leaks is continuous and in the period of a month or year, its cost is considerable.

At 100 psig a 1/32-inch leak will waste over 10,000 lb steam per 30-day month. A ½-inch diameter hole will waste about 1 million pounds of steam in the same time, costing $700 at 70c per 1000 lb steam.

High pressure steam because of its very high velocities to atmosphere, wire draws or cuts through the metal and enlarges itself rapidly. Repairs become more difficult as the hole enlarges. Maintenance on leaks must be immediate.

Steam Loads

From the data presented thus far on the various uses of service steam most commonly encountered in average commercial and industrial establishments, it is possible to compute the total steam consumption of the plant. Knowing the general uses for steam, it is possible to compute the steam demands. The type of loads for the various uses of steam follows:

Steam Use	Load
Space heating	Winter
Warm air ventilation	Winter
Humidification	Winter
Hot water heating	Year-round
Solution heating	Year-round
Process steam	Year-round
Prime movers	Year-round
Steam air conditioning	Summer
Line losses	Greater in winter
Morning pick up, extra demand	Greater in winter

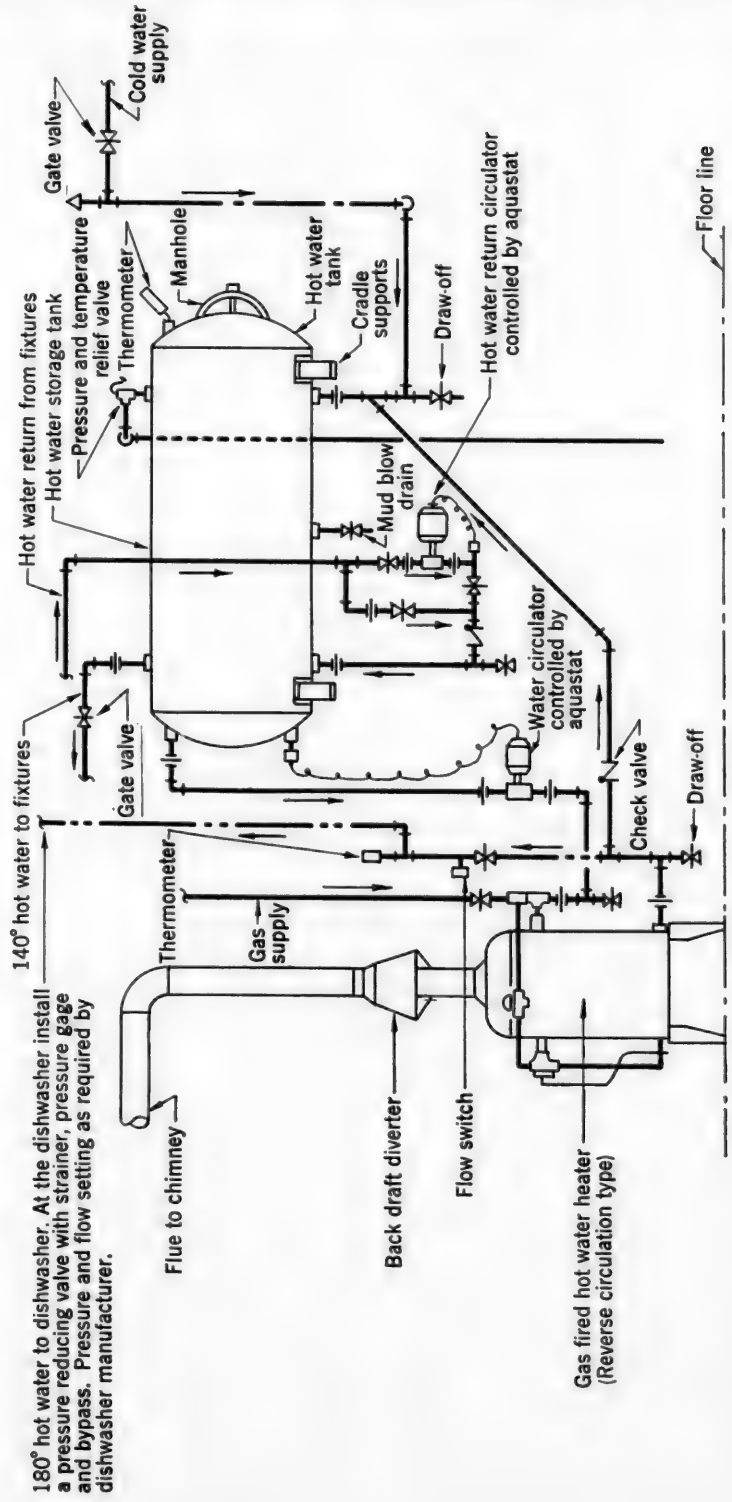
The plant should be divided into departments or areas; or by floors, apartments; or other functional or accounting units. In this way monthly steam or boiler costs can be allocated to individual established segments of the organization. It is not usually practical to provide steam meters for individual departments, not even in very large plants. Initial computations of the steam using equipment by these divisions will establish fixed bases for cost or demand breakdowns. Piping can be figured from each unit or group and computed as the hourly output accumulated back to the boiler plant or steam source.

The departmental or floor demand is simply the sum of all of the individual hourly uses of the equipment within that department, including line losses, leaks, and all steam that leaves the tee or point in the steam headers leading to that department.

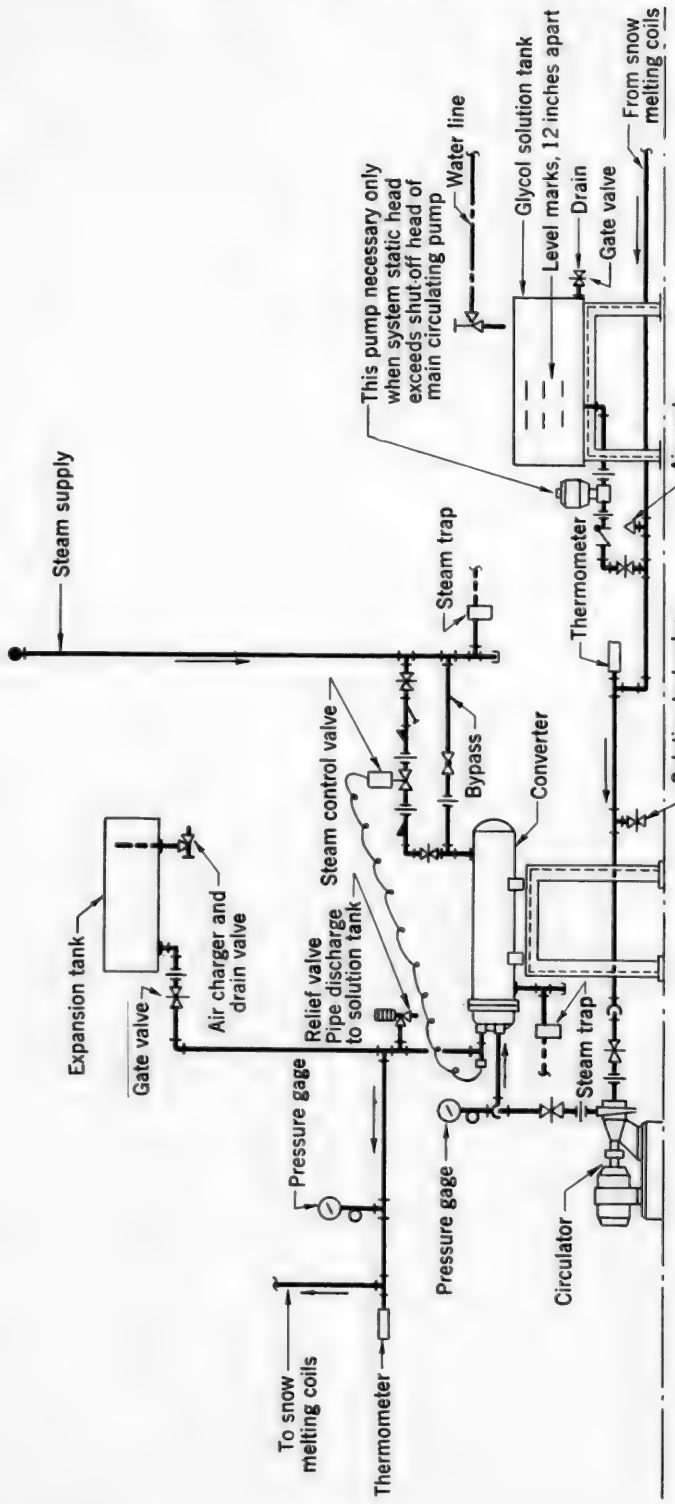
TABLE 9.—FUNCTIONAL GROUPINGS FOR STEAM TRAPS

Function	Type	Operating Features
Main steam system master trap	Float or continuous flow	Large capacity to remove all line condensate, ⅓ to ½ lb per sq ft EDR
Drip, drain or low point	Float or thermostatic	Installed at low points to remove collected water and air
Radiator	Small thermostatic	Operated by temperature rather than water level
High pressure or process	Select proper type bucket or adequate capacities	Separate trap for each piece of equipment. Saving 10 to 25% over single trap for an entire group

DUAL TEMPERATURE SERVICE HOT WATER


Cold water supply
Gate valve
Manhole
Hot water tank
Cradle supports
Draw-off
Floor line
Thermometer
Pressure and temperature relief valve
Hot water storage tank
Hot water return from fixtures
Hot water return circulator controlled by aquastat
Mud blow drain
Water circulator controlled by aquastat
Gate valve
Check valve
Draw-off
140° hot water to fixtures
Thermometer
Gas supply
180° hot water to dishwasher. At the dishwasher install a pressure reducing valve with strainer, pressure gage and bypass. Pressure and flow setting as required by dishwasher manufacturer.
Flue to chimney
Back draft diverter
Flow switch
Gas fired hot water heater (Reverse circulation type)

SNOW MELTING SYSTEM HOOKUP



Drawings on This and Reverse Page,
Courtesy of Charles N. Bush of Fay, Spofford & Thorndike, Inc., Boston, Mass.

Design and Features of Traps

Part 3 of an article covering various types of steam traps to provide basic understanding of their characteristics. This part of the article deals with bucket trap design, liquid expansion traps, thermostatic traps and restricted orifice traps.

WITH insufficient water in the steam trap body, the inverted bucket will not rise, regardless of whether or not stream is present. The trap has then lost its prime and steam will therefore blow through the open discharge valve until an adequate amount of condensate is received. This condition may be rare and its duration brief, but there are conditions of installation, operation and kind of equipment drained, where condensate replacement is delayed. There is no difficulty in restoring prime when the system or connected apparatus is started, the quantity of condensate being abnormal at such times. Fill can be made through a trap connection, or the valve on the discharge side of the trap closed until sufficient condensate collects. If the inlet valve is opened to prime the trap, it should be done slowly.

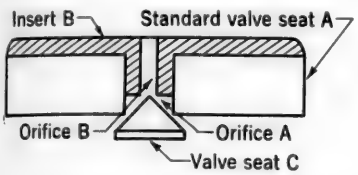


Fig. 33. Details of a dual valve seat.

Loss of prime can result from several causes. For example, a drip may receive but little condensate, or none at times, as with intermittently operated equipment. There may be a superheated steam main where all moisture might be re-evaporated in operation, although during warming up, there would be much condensate received. Superheat may also evaporate all of the condensate in the trap body, or just enough for resultant flash to blow back what is left, especially so when but little condensate is being received.

When a plant is shut down, the resulting cooling will produce a partial vacuum and possibly cause backward flow of condensate. Backward flow can also occur when the trap is set higher than the equipment it drains. A check valve on the inlet side of trap to prevent this adds some resistance to forward flow, but such resistance is of no moment where the pressure differential across the trap is always sufficient for proper operation.

Prime can also be lost with any sudden drop in line pressure causing condensate to flash, by the opening of a bypass if below trap level, or by opening of a test cock on the inlet side of the discharge valve. Loss of prime, however, may never occur on the usual application. Supply pressure and return vacuum may be such that trap temperature will be reduced to return line temperature because of flash and radiation from uninsulated trap body before condensate can be sufficiently evaporated. Furthermore, as long as steam is in the line, thermal losses from trap body and convection may supply enough condensate to maintain prime. Where possible, the top of the trap should be below the outlet tapping of the equipment served. This drains the unit, insures a more constant water seal and sometimes provides a head of water to assist trap discharge. When a trap is of a design which cannot be serviced without disturbing its piping, water will be lost from the trap body and line whenever the trap is serviced.

Bucket Trap Design

Often when trapping superheated steam, an inverted bucket trap may lie dormant for a long period of time because no condensate is received. With but little condensate flow, the trap will reach a balanced position and dribble. To overcome this condition, one manufacturer offers as optional equipment, a dual valve seat. As shown in Fig. 33, the valve seat *C* makes a normal seating contact with the orifice of the standard valve seat *A* and the orifice in insert *B*. As the valve leaves its seat, condensate passes into the low pressure area between the orifices *A* and *B*, flashes into steam, creating a back pressure on the top of the valve *C*.

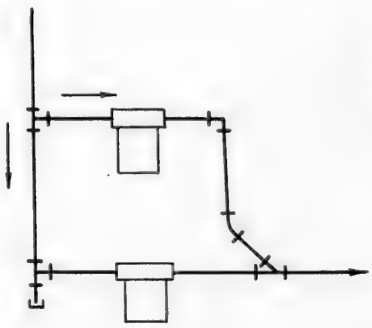


Fig. 34. Arrangement showing the installation of two traps.

This lowers the net effective pressure holding the valve closed, so that the float, which has begun to open the valve, has the force holding it up suddenly reduced. This accelerates the fall of the float and the opening of the valve. The sharp discharge prevents the trap from

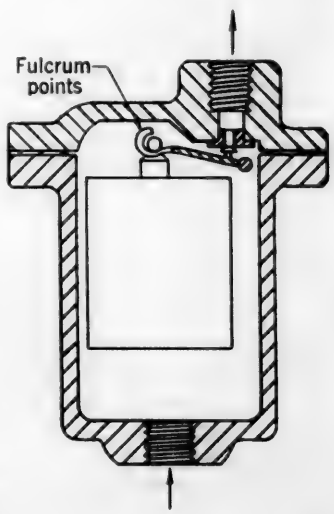


Fig. 35. Two fulcrum points provided in an inverted bucket trap.

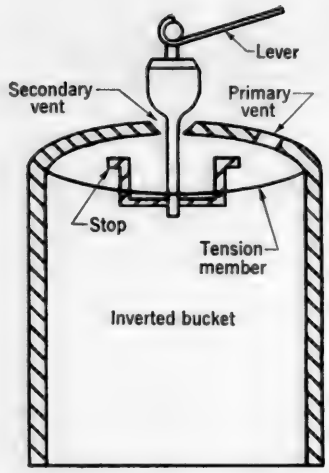


Fig. 36. Venting of this inverted bucket is provided in two steps.

dribbling, but wherever condensate flow is more favorable, the dual valve seat should not be used because it decreases capacity due to reduced effective orifice area by the addition of the insert. Another way of meeting the condition of light and heavy loads with bucket traps is to use two traps, as in Fig. 34, one set higher than the other to take the backed up abnormal load.

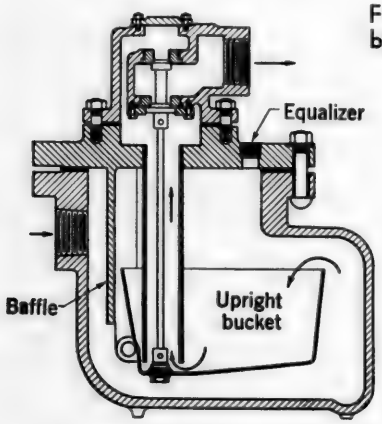


Fig. 37. Upright bucket with two discs and seats.

In an inverted bucket trap, it takes more initial power to crack the valve from the orifice than to open it wide, therefore one manufacturer uses two fulcrum points, Fig. 35, to distribute power and valve travel as required. Maximum leverage power is obtained by utilizing the first fulcrum point, after which the second fulcrum point takes over and moves the ball farther away from the seat. This timing of power requirements in two steps allows the use of a relatively short lever, which in turn reduces the size of the trap body and therefore the cost of the trap. The orifice may also be large and capacity thereby increased. This same manufacturer extends the idea of two steps to venting the inverted bucket, Fig. 36, using the usual small vent hole as a continuous primary vent and a large secondary vent which is opened by the bucket as it rises and is closed by a tension member as the bucket lowers.

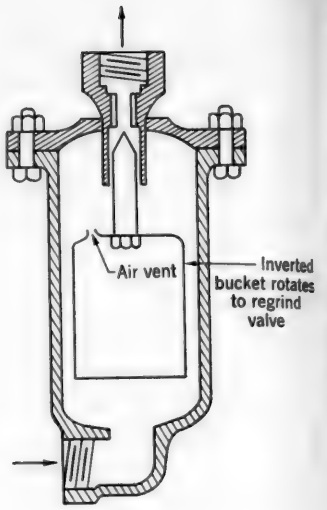


Fig. 39. Inverted bucket with valve that can rotate.

An upright bucket trap of one make, Fig. 37, utilizes two discs and seats. One disc and seat, larger than the other, closes with the pressure, the other against the pressure. The two discharge orifices open simultaneously to provide increased capacity. Figure 38 shows an upright bucket trap of small size for use at radiators and small utilities. There is also an inverted bucket trap, Fig. 39, and an upright bucket trap, Fig. 40, with a valve that rotates with the bucket, as trap discharges, for better seating. One in an upright bucket trap, accomplishes the same purpose, but in this case it does so with spiral vanes on a valve holder which revolve with each discharge. Others may have a built-in steam bypass to save one around the trap, an internal strainer and an internal air bypass which is said to seal itself with water against the passage of steam. A few upright bucket traps have leverage to increase their power.

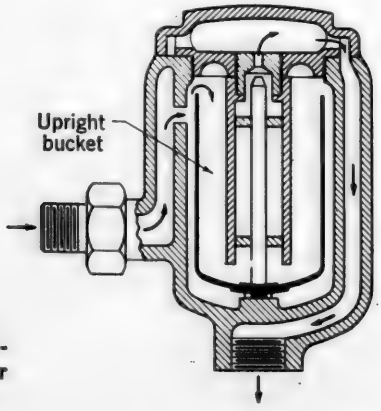


Fig. 38. Small size upright bucket trap for use at radiators.

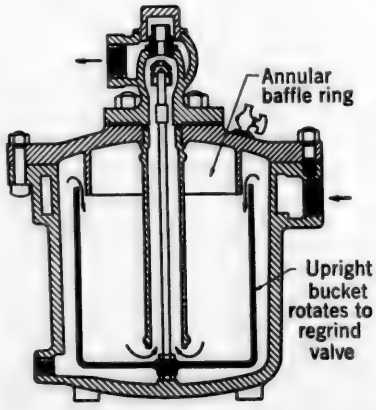


Fig. 40. Upright bucket designed to clean valve through rotation.

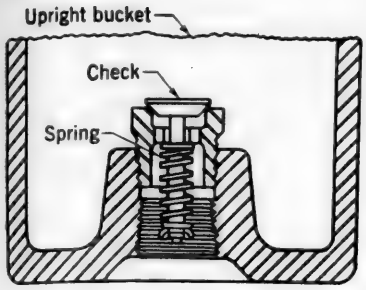


Fig. 41. Upright bucket with internal check valve.

One make of upright bucket trap, has an internal check valve, Fig. 41, to save labor and fittings and insure that one will be used where the trap is likely to lose its prime. Check valves are needed in inlets and/or outlets according to conditions of overhead return or lift to inlet. They should be installed in a horizontal line. An inlet check should be as close to the trap as possible. Incidentally, a check valve with composition disc should never be used in heating, since the disc may curl up after a time and cause the valve to leak. Some traps have the discharge valve at the top of the bucket where the air collects and away from where sediment collects. Other traps have reverse flow or various other methods to secure scrubbing action, and there are inverted buckets with rounded bottom edges for better guidance when contacting sides of trap body.

Stopping water surface tension from preventing air to escape through the vent hole in the top of an inverted bucket is said to be overcome by making this hole of venturi shape. One make of upright bucket also utilizes venturi action at its valve to increase capacity. Where fire and explosion hazards make the use of iron undesirable, there is an inverted bucket trap with forged steel body suitable for all pressures. Snap action is obtained in float and bucket traps in various ways. One way is where the upright bucket in dropping actuates the valve by impact. The valve in this case is not attached directly to the float.

Liquid Expansion Trap

Liquid expansion traps, Fig. 42 contain an element *E* constructed with a corrugated tube *T* filled with a suitable expansible liquid *L*, after which it is hermetically sealed with the screw *S*.

Hot condensate or steam passing over the element *E* will cause the liquid to expand and to compress the tubing *T*, thereby pushing the rod *R* and valve head *V* forward, closer to the inlet valve. The higher the temperature of the condensate, the greater will be the

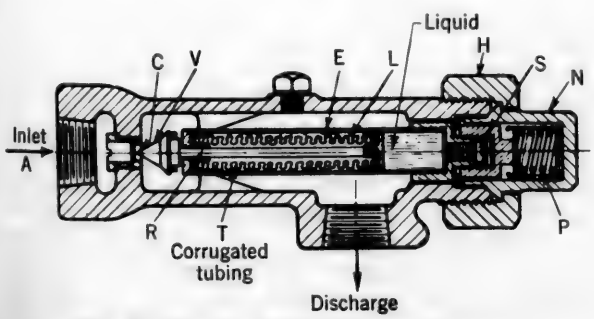
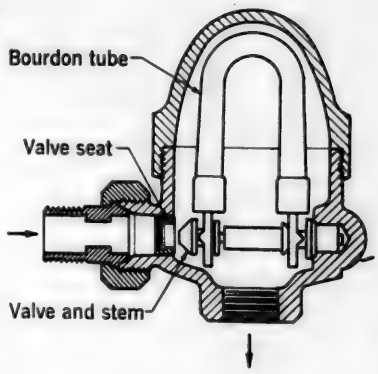


Fig. 42. Details of a liquid expansion trap.

Fig. 43. Thermostatic trap for low pressure service.



movement by expansion, and consequently the more travel of the valve head until it finally expands sufficiently to close the inlet valve *C*, entirely. Adjustments can be made by turning the nut *N* so that the trap can be made to close at any temperature desired.

Should condensate at any temperature above 212 deg pass the valve *C* and enter the trap body, it will immediately be subject to some re-evaporation causing its temperature to drop to 212 deg, provided the discharge pipe is open to the atmosphere. When the discharge side of this trap is subject to atmospheric pressure only, the highest temperature possible to which *E* can be subjected is 212 deg. Therefore, in setting the trap for closing, adjustment has to be made so that the element of the trap will definitely close the valve *V* at the proper temperature.

To make an adjustment to this trap, the union nut *H* is first loosened slightly and then the adjusting nut *N* is turned either to the right or to the left for higher or lower temperature. The union nut is then locked to hold this adjustment.

A safety spring *P* is inserted in a case and compressed to give an initial tension, more than necessary to hold the valve closed against the highest pressure to which it will be subjected. Any extra expansion which might occur if scale or dirt on the valve seat allows the steam to leak past and raise the temperature very high, will be taken care of by the compression of this spring.

With a suitable charged element, it is possible to obtain lower discharge temperature—say 70 or 80 deg with an adjustment range of 15 to 20 deg above and below the factory setting. Therefore, this type trap is very useful in being able to give a wide range of setting temperatures, which is found economical in draining coils.

Higher temperatures give greater movement by ex-

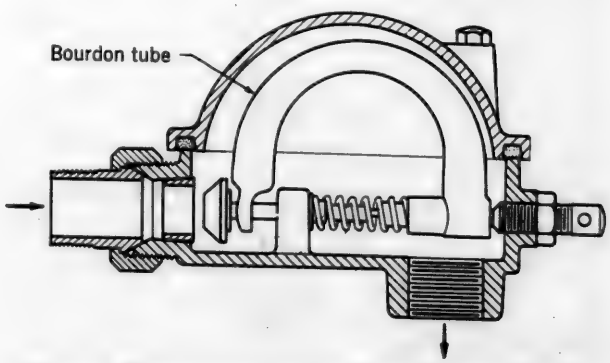


Fig. 44. Thermostatic trap for high pressure service.

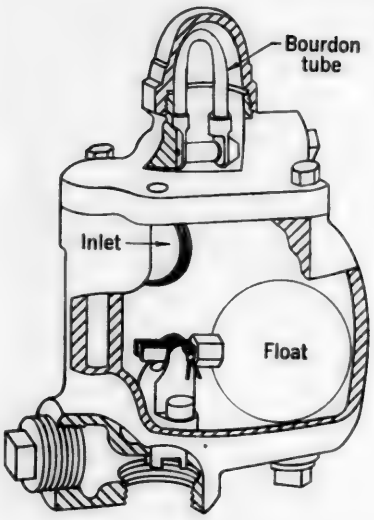


Fig. 45. Float thermostatic trap.

pansion, but require a cooling leg. If the discharge pipe is open to atmospheric pressure, re-evaporation will lower the condensate to 212 deg and the elment can, therefore, never be subjected to a higher temperature for the given condition. By adjustment at the union nut, condensate can be discharged at any lower temperature down to 190 deg. By suitable filling in the element, condensate

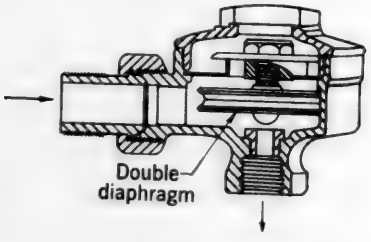


Fig. 46. Trap with a double diaphragm.

discharge temperature may be still further lowered down to 70 deg, or it may be raised to any reasonable temperature higher than 212 deg, providing the back pressure at the outlet is suitable. These characteristics allow the trap to be used as an indirect temperature controller in a wide field of process applications and to hold back condensate long enuogh for discharge at low temperatures without flash. This is a thermal saving, particularly where condensate is wasted to atmosphere and where there would otherwise be flash.

Although 212 deg is the highest attainable temperature when the discharge is at atmospheric pressure, it is possible, with a suitable back pressure on the outlet of

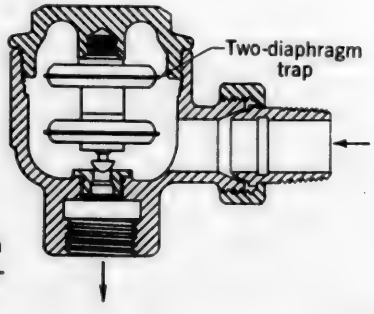


Fig. 47. Trap with design using two diaphragm elements.

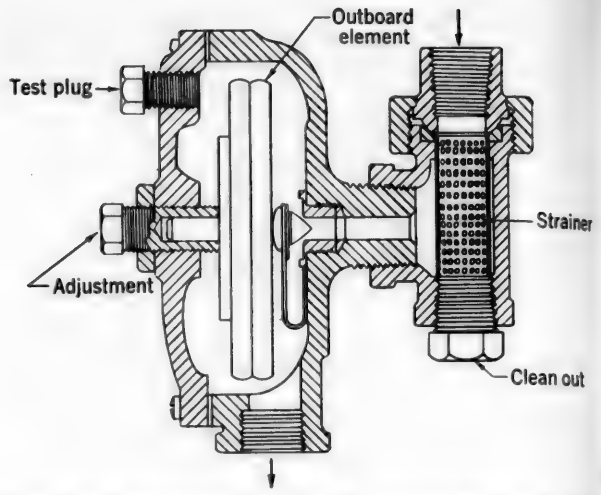


Fig. 48. Thermostatic trap that is outboard for high pressure service.

the trap, to operate at any reasonable temperature above 212 deg. This function of a liquid expansion trap enables it to be used as an indirect temperature controller, and in this respect, it has a wide field of application when applied to condensate discharge from a vessel, in direct contact with the liquid to be heated, or inserted in the steam inlet to small steam heated equipment.

A safety spring compressed within the union nut gives an initial tension more than necessary to hold the valve closed against the highest steam pressure to which the

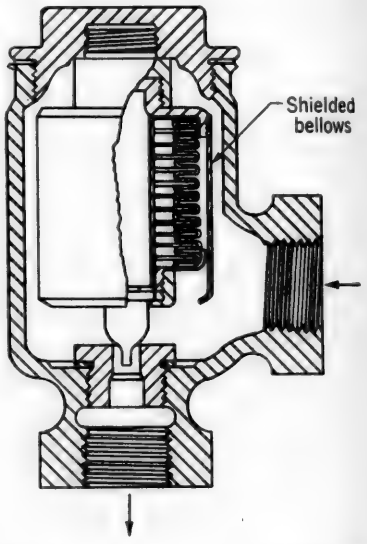


Fig. 49. Bellows type thermostatic trap.

trap may be subjected. Any extra expansion which might occur, should scale or dirt stick to the valve seat and allow steam to leak past and raise the temperature, will be taken care of by the compression of this spring. This trap is non-freezing.

Bourdon Tube Type Expansion Trap

The principle of thermostatic expansion of a Bourdon tube common to gages is utilized outboard in the thermostatic trap, Fig. 43, for low pressure service, and Fig. 44, for high pressure service, also in the float thermostatic trap, Fig. 45. Thermostatic traps, in place of the more usual single diaphragm element of two twin diaphragms

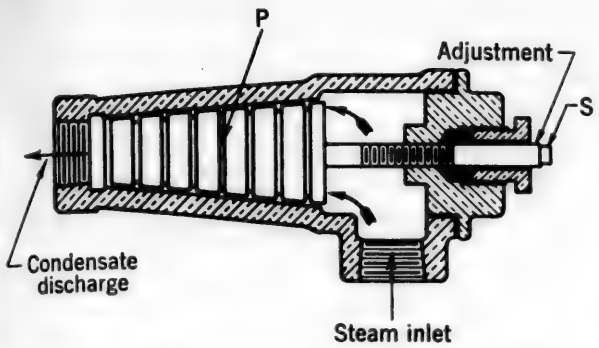


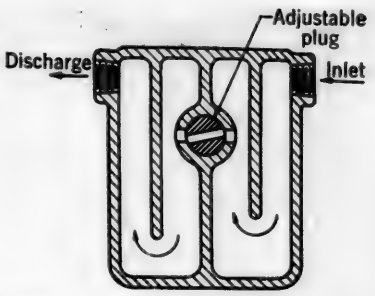
Fig. 50. Trap with grooves to interrupt steam flow.

joined together, may have a duplex or double diaphragm element, Fig. 46, or there may be two or more diaphragms elements as Fig. 47.

The thermostatic trap shown in Fig. 48 is outboard for high pressure service and is provided with an adjustment for movement of element to meet conditions. A strainer should be used as shown. The bellows type thermostatic trap shown in Fig. 49 is fitted with a shield around its length to protect the bellows from water hammer and the abrasive action of steam and water at high velocities with high pressure steam. There are also stops at the bottom of the shield as noted to prevent over-expansion, should the bellows be thoughtlessly removed from high pressure steam service while still hot. Over-expansion remains permanent and the element must then be discarded. The shielded bellows is sometimes used in other types of traps.

In some old radiator installations there will be found traps of the float thermal type, the float and carbon expansion post guide operating independently to open or close the valve seat; also the float thermostatic type where the valve is open or closed by the float or by the expansion of the liquid within the float.

Fig. 51. Trap with an adjustable orifice.



Restricted Orifice Traps

The restricted orifice trap is commonly recognized as one in which the condensate passes through a small orifice or a restricted passage, the area of which is either permanently set or adjustable so that it can be varied to suit prevailing conditions. Figure 50 illustrates one type of trap relying on a series of small grooves to interrupt the flow of steam and allow only water to pass. Adjustment is made by turning the spindle *S* which gradually raises or lowers the plug *P*.

Figure 51 illustrates a type of trap in which an adjustable orifice is inserted in the passage.

The trap is most efficient at higher loads and is designed for continuous discharge of cool condensate and air to provide quick heating and more even temperature of a process. As the condensate increases in temperature, it flashes in the flash chamber and lessens flow due to the choking effect. Although there are no moving parts, particles in motion do help to clear away sediment. The trap should be protected by a strainer in the pipe line before the trap especially so to prevent wear of the small orifice with resulting waste of steam. This trap provides simple straight through piping.

Where load variations are extreme, a single adjustment made for average flow may cause condensate to back up during maximum flow and also allow some steam to pass through during minimum flow.

Air Conditioning for Submarines

Air conditioning is by no means new to the "silent service." It dates back to the early thirties; but with the advent of atomic power, its contribution to the comfort of underseas living takes on new and added significance.

A big tactical advantage of the atom sub is that it can remain completely hidden under water almost indefinitely. It doesn't have to surface or use a snorkel to recharge batteries, as was the case with pre-atom models. To capitalize on that advantage, a plentiful supply of fresh air has to be continuously on tap so that the crew can function as efficiently as does their vessel.

The Navy recently disclosed that the first A-sub, *Nautilus*, cruised the 3100 miles from San Diego, California, to Panama, completely submerged and at an average speed of 19.1 knots. Its air-conditioning system, as well as its atomic power plant, made that record-breaking performance possible.

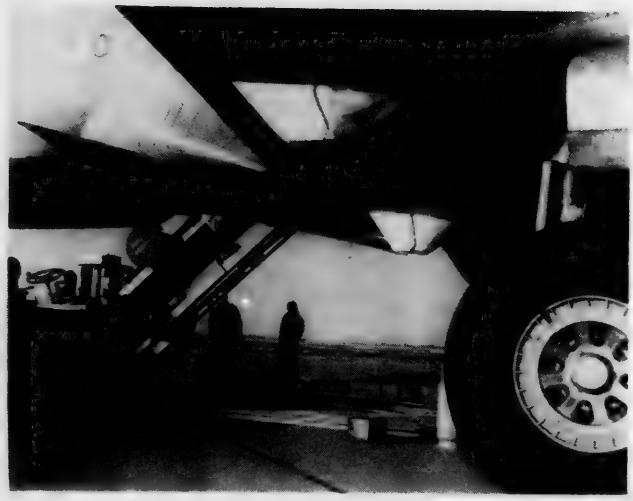
The air-conditioning system on the atomic submarines is big and hard working, according to Armstrong Cork Company's Insulator publication. It has to be in order to remove reactor heat and the heat of the steam the reactor generates; to carry off heat from machinery and cooking; and to provide clean air at comfortable temperature and humidity for efficient functioning of both men and machines.

All this is accomplished underwater, without the use of the snorkel breathing apparatus to bring in air. Telltale bubbles caused by release of gases also have been eliminated. Details of how this has been accomplished are closely guarded Navy secrets, but some interesting facts on the refrigeration and air conditioning equipment used in the atomic subs have been released.

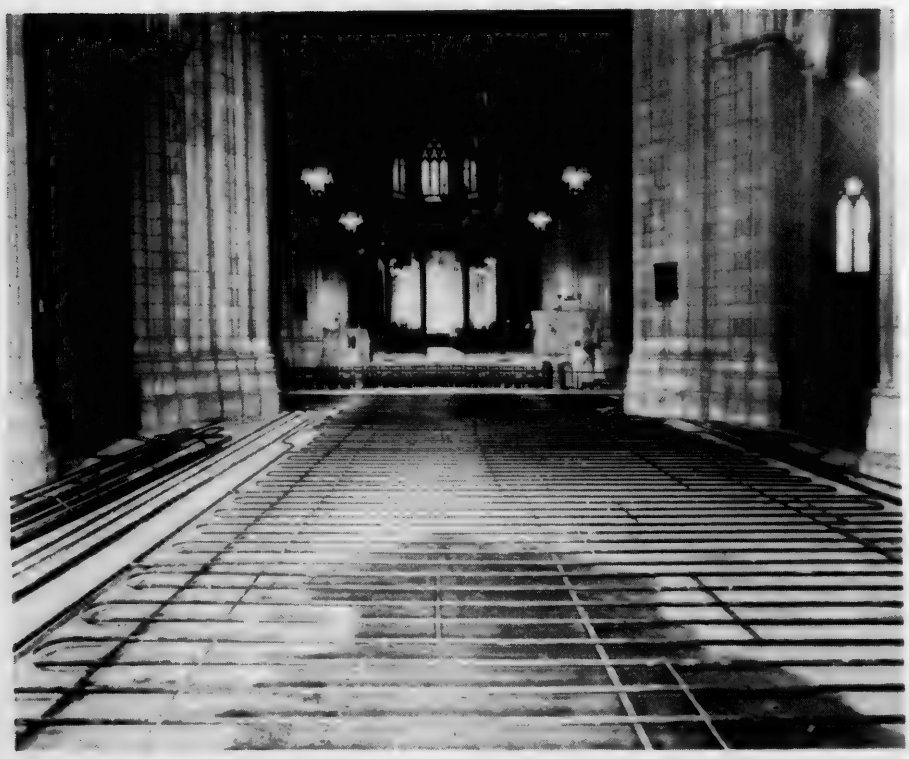
The *USS Nautilus* and the *USS Seawolf*, the two big custom-built vessels that led off the Navy's A-sub program, each have 240-ton refrigeration plants. The refrigeration system on the *Skate*, first of the production model A-subs, and of the three other ships in this class, has a capacity of 160 tons.

Among the special equipment to keep air fresh and clean are coconut-shell charcoal filters for odor and gas removal. To keep space requirements to a minimum, conditioned air is circulated through small ducts at high velocities.

Picture



EQUIPMENT AIRLIFTS. (Top) An Air Force Globemaster 124 is fed a Trane air conditioning component. In total, 48,000 lb of air conditioning equipment was air freighted from La Crosse, Wis., to Norton Air Force Base, Calif., for use with the Intercontinental Ballistics Missile program. (Right) Twenty-four hours after being loaded aboard plane at Pinellas Airport, St. Petersburg, Fla., this Orr & Sembower 30-hp packaged boiler reached its 9000-ft above sea level destination — Schering Corporation's new pharmaceutical plant in Bogota, Colombia. If the boiler had been shipped by boat and then overland by truck, the usual method for transporting such equipment, delivery would have taken about five weeks.



WARMING WORSHIPPERS. National Episcopal Cathedral in Washington, D. C., like many European cathedrals, had been difficult to heat because of the great height of its stone vaulted ceilings. A radiant heating system was advocated by the architect, Philip H. Frohman, F.A.I.A., after satisfactory results in other churches he designed. Thirteen tons of Byers wrought iron pipe are used in this system, engineered by M. X. Wilberding Co., and installed by Morris & Eagan Co., both of Washington.

Paragraphs

THEIR VERSATILITY IS SHOWING. (Right) When a freak wind storm blew down a bridge from the pump house to the water intake in the Ohio River at the Aliquippa works of Jones & Laughlin Steel Corporation in Pittsburgh, Dravo Corporation was called upon to construct this 160-ft bridge as part of its project to install new pumps and other necessary equipment boosting the plant water supply capacity to about three times that required daily by the entire city of Pittsburgh.

TRAINING TRADESMEN. (Left) Workable, on-the-job knowledge of plastic pipe, its physical properties, fabrication, and application is provided by the training school at The General Tire & Rubber Company's Bolta Products Division in Lawrence, Mass. Here, journeymen, pipe fitters, and plumbers spend one hour in class followed by two hours of manual practice at each session under the guidance of Instructor John Williams (second from left) and his able assistants.

CUTTING COPPER COILS. This electronically-controlled machine at Chase Brass & Copper Company's Cleveland plant converts large coils produced by inverted drawblocks into accurately measured coils of specified length. Incoming 60-inch dia coils, containing tube up to one-inch OD, can be recoiled into 20 to 40-inch coils at 500 fpm.

LOUIS BLENDERMANN ON

PIPING AND PLUMBING

Draining the Planting Area

PLANTING areas have become more and more popular in all types of buildings. Many new hotels, motels, department stores, apartment houses, shopping centers, banks and numerous other types of buildings will include a planting area as a decorative scheme to enhance either the interior or exterior of a building.

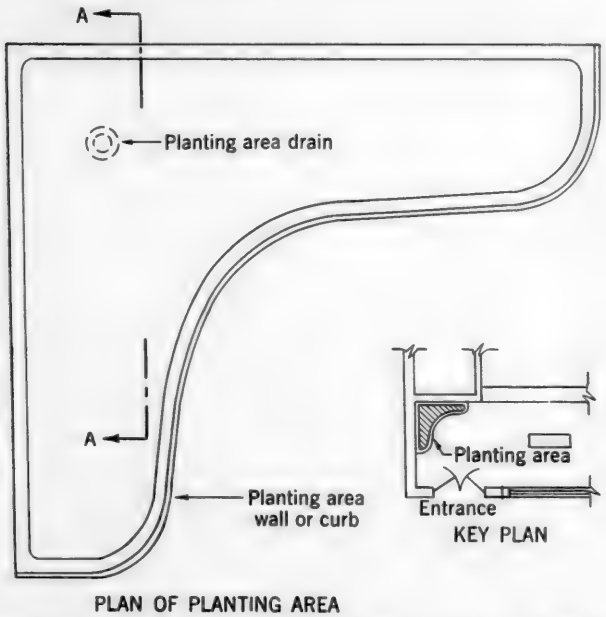


Fig. 1. Layout of a planting area that might be included in a building. Key plan shows location of planting area.

The planting area may consist of a small space, containing but a few flowers and shrubs or it may be an elaborate area devoted to many types of flowers, shrubs or even small scale trees.

When such planting areas are utilized outside of a building, special consideration need not be required since the water falling on the planting area will seep through and into the earth. When the planting area is included inside the building or on the roof of a building, then proper drainage becomes a major consideration. The same thought must be applied to planting areas located at the exterior of a building over an underground portion of the building.

Interior Planting Areas

For example, let us assume a planting area provided by an architect for the interior of a bank, as shown in Fig. 1. This area has been gracefully curved to offer a distinctive appearance. Indicated in the figure is the location of the planting area drain which is a vital part of the planting area. The drain permits a natural seepage of water through the earth. Otherwise the soil would become saturated, which is not the best condition for many types of planting.

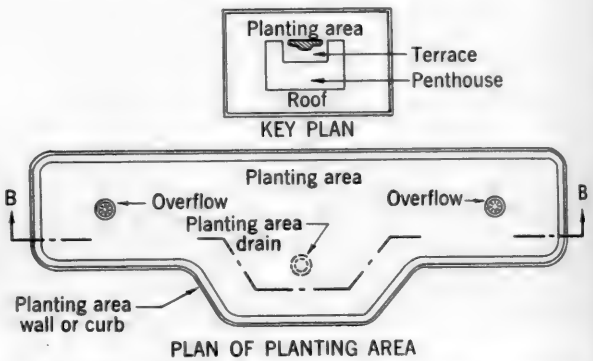


Fig. 3. Layout of a planting area that might be included on the roof of a building. Key plan shows planting area in relation to penthouse.

Unless a special arrangement is considered for watering the area, a source of water supply must be located

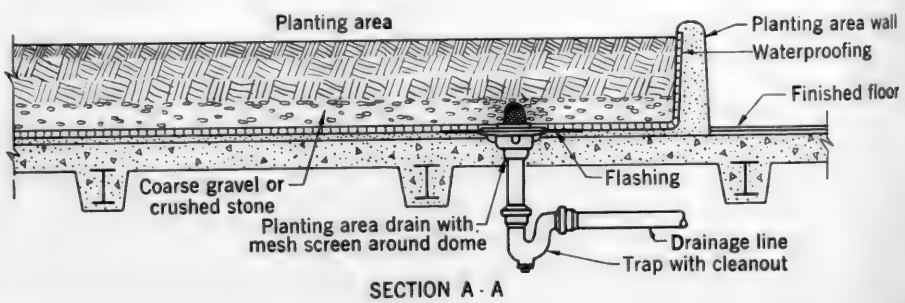


Fig. 2. Section through planting area of Fig. 1, showing arrangement of planting area drain.

near the area so that a hose can be used for the watering.

Section A-A through the planting area of Fig. 1, is shown in Fig. 2 and illustrates pertinent details as well as the means for providing drainage.

The architect may choose to select any number of different types of construction materials for the walls around the planting area. For example, we have indicated concrete walls which can be lined with waterproof material or can be painted with a waterproofing compound. These walls are generally 18 to 24 inches high, depending upon the proposed depth of the soil, the architect or landscape architect wishes to maintain.

The bottom of the planting area is sloped toward the drain. The drain itself, consists of a unit, especially designed for this purpose, which is flashed to the construction in a watertight manner. Lead or copper flashing is used for this purpose. A shallow dome which is slotted or perforated is placed on the drain. This dome includes a bronze mesh screen that fits over it.

Coarse gravel or crushed stone is placed at the bottom of the planting area to a height that covers the dome. The function of this material is to allow the water to seep through the earth in a natural way and then flow freely to the drain. This material also filters out the fine silt that is washed down with the water and prevents it from clogging the fine mesh screen.

The drainage line should not be connected directly to the sanitary system but instead should be discharged as an indirect waste into an open sink or vessel that is properly vented.

Roof Planting Areas

The planting area that may be provided for a penthouse garden is generally similar in construction to that of the interior planting area. Here, however, the elements must be taken into consideration.

Figure 3 shows an installation of this type.

The planting area can be of any desired shape or size according to the architect's design. A rather simple arrangement is pictured for the purpose of discussion.

In addition to being watered by a hose, a roof planting area is also subject to natural rainfall. A heavy rainfall will quickly saturate the soil and if not controlled, will flow over the walls of the curb, carrying precious top soil with it. In addition to losing the top soil, this soil also spoils the neat appearance of the roof area. Thus, unless proper means of drainage is provided, the top soil will have to be replaced after every rain storm and the roof area will have to be cleaned after each storm.

To avoid this condition, one or more standpipes with drainage domes must be employed, depending upon the

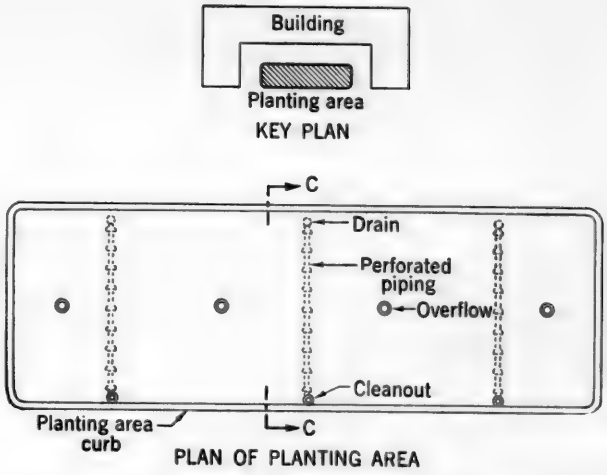


Fig. 5. Layout of a planting area that might be included at the exterior of a building. Key plan shows relation of planting area to building.

overall size of the planting area. These overflow drains are usually so placed that they will be concealed by the flowers or shrubs. A typical example of the drainage devices is shown in Fig. 4.

The purpose of the overflow drains is to carry off the rainwater when it exceeds the height of the level of the top soil contained in the planting area. The slotted dome is oversized to allow air pressure to balance the water discharging into this piping.

A planting area drain, with the same function as that explained for the interior planting area, is installed at the bottom of the area. This drain also functions to allow water to drain through the earth in a natural way.

Every precaution must be exercised when erecting a planting area on a roof to avoid any possibility of rain water seeping under the area and causing leaks. Since this is the architect's problem, it will not be given any further attention at this time.

The planting area drains and the overflow drains can be connected to the interior leader piping. Cleanouts are placed in the drainage line to permit clearing the line of any stoppages that may be caused by accumulation of earth silt. When adequate attention is given to the effect of the elements on a roof planting area, one can be assured of a system that will function properly.

Large Exterior Planting Areas

Often a planting area of enlarged scope will be placed at the exterior of a building. As mentioned earlier, if

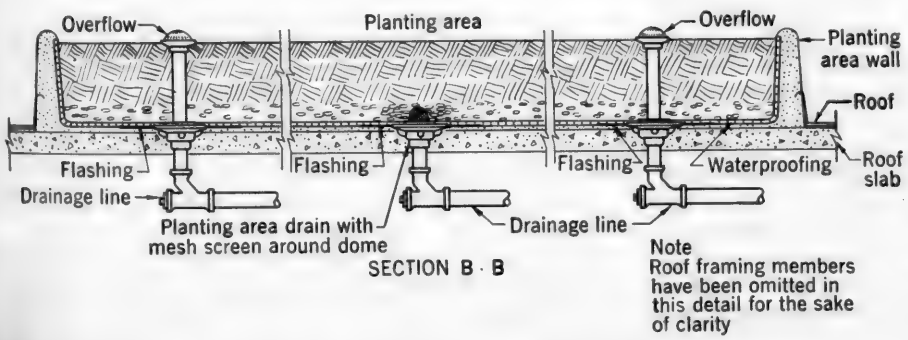


Fig. 4. Section through planting area of Fig. 3, showing planting area drain and overflow drain.

the water in this instance can seep through the soil and into the earth, no unusual problems will be experienced. There are occasions, however, when such planting areas are located over an underground garage or over an underground portion of a building. When this situation is prevalent, special care must be given the design of the drainage system. The engineer has many methods at his disposal. One treatment is shown in Fig. 5.

The area given, for example, is approximately 20 ft x 60 ft. We shall assume that it is located over an underground parking garage for the building shown in the key plan. This type of a planting area is quite popular for a number of different types of buildings.

Once again, we have provided overflow drains to prevent the rain water from overflowing the walls of the curb and carrying away the top soil. For draining the planting area we have utilized a system of perforated clay pipe. The clay pipe is installed as shown and connects with a drain that is in turn connected to the drainage piping in the space below. The drainage piping below may be connected indirectly to the sanitary system or directly connected to the system of storm water piping that is run in the space below. The favored means of connection must be determined by the engineer. A section through this planting area is shown in Fig. 6.

The overflow drains are installed in the same manner as that shown in Fig. 4. The clay pipe is installed to follow the slope or valley that has been provided in the bottom of the planting area. This slope is in the direction toward the drain.

Coarse gravel or crushed stone is again used to offer a path of travel for the water that seeps through the earth. A cleanout is provided at the end of the clay pipe to permit clearing the clay line of any soil or silt that may accumulate. To accomplish this a hose is used and the water is applied in a gentle manner to flush the accumulation out of the line. It is good practice to install the piping in the space below, in such a manner, that it can be equipped with a sand interceptor with easy access for cleaning. The sand interceptor can be a cast iron basin or any other means that the engineer may devise.

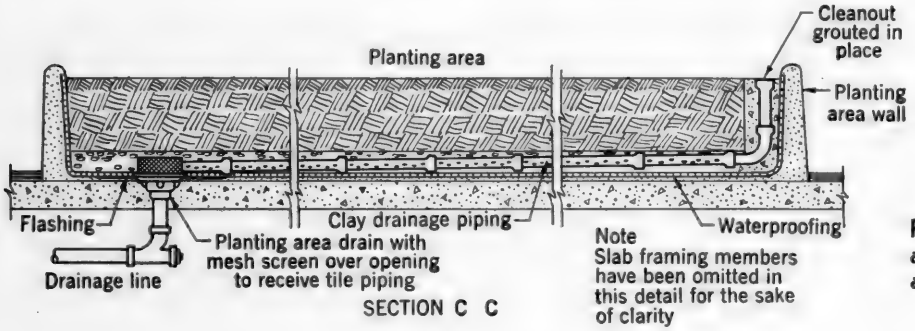

Cleanout grouted in place
Planting area
Planting area wall
Flashing
Clay drainage piping
Waterproofing
Planting area drain with mesh screen over opening to receive tile piping
Drainage line
SECTION C C
Note
Slab framing members have been omitted in this detail for the sake of clarity

Fig. 6. Section through planting area of Fig. 5, showing drain and arrangement of clay drainage piping.

A note of caution: Deep rooted shrubs or trees should never be placed near or directly over the planting area drains or drainage piping. Such roots can block up the mesh screen dome of the planting area drain or can plug the perforated clay piping. Hair-like roots of some trees, can enter the pipe perforations, grow inside the pipe, and completely block drainage flow.

In addition to the methods illustrated for draining planting areas, there are other means that can be employed. When special effects are utilized for watering the planting area, it may also be necessary to give some special attention to the system that can be used to drain the water and control its level.

Review Made of Absorption Cooling Studies

Any study of absorption cooling might well begin with "The Absorption Cooling Process—A Critical Literature Review," by R. T. Ellington, G. Kunst, R. E. Peck, and J. F. Reed of the Institute of Gas Technology, Chicago 16, Ill. Parts of this five-dollar, paper bound study were pre-published in July, 1957, in this magazine under the title "Problems in Cooling with Gas."

To the authors at the Institute, however, the problems are how to improve already workable, commercial processes. Altogether, 104 references have been cited. The Carrier, Servel, and Williams absorption systems are described and illustrated thoroughly. Cycles employing several other absorbent-refrigerant combinations are reviewed. Physical and thermodynamic data are presented graphically and in tables so that it is not difficult to follow this presentation.

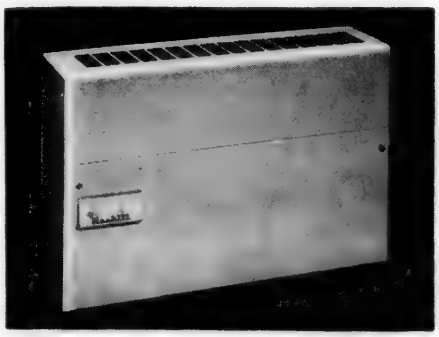
There are many promising combinations that have yet to be tested. Research on some of these indicates the possibility of much more efficient cycles. The possibility of air-cooled absorbers is indicated. New absorbents may prove the feasibility of new open cycles, where the medium to be conditioned is brought into direct contact with the components responsible for the conditioning. This system is already partially utilized in the case of the dry desiccants, silica gel and alumina, and in aqueous solutions of lithium chloride and triethylene glycol. Further development could make the condenser and evaporator an anachronism in air conditioning.

NEWS OF EQUIPMENT AND MATERIALS

Use the convenient prepaid postcard appearing on the last page for securing further information on new equipment and materials described in this department.

Seven Cabinet Units

A cabinet air conditioning unit in seven basic sizes providing cooling capacities from 17,500 to 111,000 Btu is offered by John J. Nesbitt, Inc., Philadelphia, Pa. Called the Roommate, it is designed for hospitals, offices, showrooms, churches, hotels, and motels, or other instal-



lations requiring an attractive appearance, quiet operation, and high-capacity performance.

Company's bypass capacity control and air volume stabilizers are offered. In the 5 largest units the bypass control provides closer summer humidity control and lowers pumping requirements, the company states. On all units with outdoor air openings, air volume stabilizers are available to save fuel costs and increase comfort.

Units may be floor, wall, or ceiling mounted with non-recessed, semi-recessed, fully-recessed, universal, or built-in arrangements. Descriptive catalog, No. 600-1, is available.

More information? Circle Item 1, postcard, last page.

One-Pipe Diversion Fitting

Bell & Gossett Co., Morton Grove, Ill., announces a new Red-Ring fitting in its Monoflo line. Monoflo is the company's trademark for the diversion fittings engineered to supply radiation above or below the main in one-pipe hot water systems.

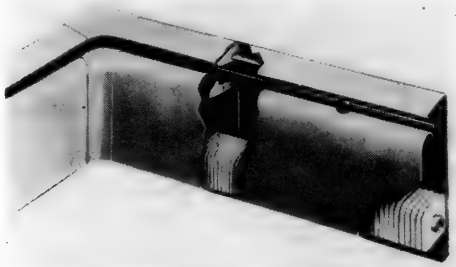
Company states that the Red-Ring unit offers the same design features found in the original diversion fittings in addition to the advantage of being used as either supply or return. It has been the practice heretofore to have one Monoflo fitting used strictly for supply and another used only as a return connection. Inventory problems are simplified because separate stocks of supply and return Monoflos are now replaced by one stock of the Red-Ring fitting.

Correct installation is made easy because the red ring on the fitting is always located between risers. The fitting is available in 1 and 1¼-inch copper at the present time.

More information? Circle Item 2, postcard, last page.

Modified Baseboard Line

General Automatic Products Corp., Baltimore, Md., has made design changes in its basebord radiation line. Modifications have been aimed toward producing a smoother, rounded, more modern appearance, and more convenient package arrangements.



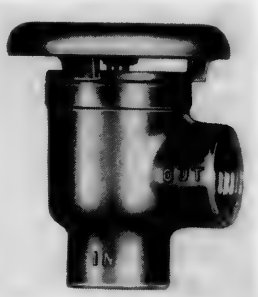
Old Model BR with rectangular fins has been replaced by Model BR 2½, illustrated, which features smaller, more nearly square aluminum fins; front cover and trim pieces that snap in place; one-piece back panel; and finger-tip control damper.

Old Model BAS which had a spiral aluminum fin arrangement has been discontinued.

More information? Circle Item 3, postcard, last page.

Anti-Siphon Vacuum Breakers

Announced by A. W. Cash Valve Mfg. Corp., Decatur, Ill., is a line of anti-siphon vacuum breakers designated Type VB. Of all-bronze construction and in pipe sizes from ⅜ to 2 inches, valves are sturdy and dependable with a good flow rate and unusually low pressure drop, company states.



These valves are designed to prevent polluted water from siphoning back into the potable water supply line in installations where the supply enters an appliance or fixture below the overflow rim. Such a condition frequently exists with open tanks and basins filled by a hose, and in dishwashers, clothes washers, and lawn sprinkling systems.

More information? Circle Item 4, postcard, last page.

Foamed Insulation for Pipe

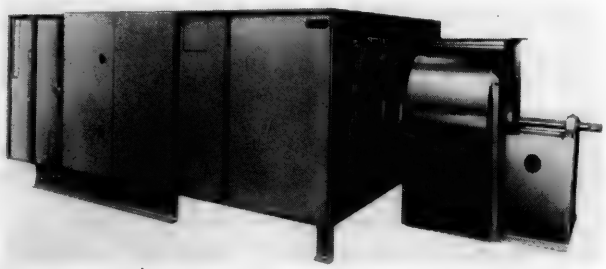
Urethane foamed snap-on insulation for industrial piping is available from Urethane Foam Div., Rainbow Industries, Inc., Butler, Pa. One of the chief raw materials of the insulation is Hylene, a Du Pont organic material.

As announced previously, this material is originally a liquid and foams into a lightweight substance of low thermal conductivity, high tensile strength, and is suitable for jobs up to 250 deg F. It is resistant to many substances that affect other insulations and will not react with metals.

More information? Circle Item 5, postcard, last page.

Four Basic Air-Handlers

Low-pressure sprayed coil and high-pressure dry and sprayed coil Climate Changer air handling units for commercial, institutional, and industrial comfort and process conditioning are announced by The Trane Company, La Crosse, Wis. Applications include multi-story office buildings, retail stores, factories, schools, hospitals, auditoriums, churches, and similar building types.



There are four basic units: a low-pressure, dry-coil unit for comfort purposes; a low-pressure, sprayed-coil unit for systems requiring all outside air; a high-pressure, dry coil unit for high pressure air conditioning systems; and a high-pressure sprayed coil unit for primary air supply of induction systems, or for ventilation air conditioning on high pressure air distributions systems where all outside air is handled.

Low- and high-pressure sprayed coil units, designed for high heat transfer efficiency, are used primarily in applications where 100% outside air is required. The units can be used for air conditionng as well as evaporative cooling and air washing. One gpm of water per sq ft of coil face area is supplied through brass nozzles of the spray system. Deep tanks equipped with spray pump connections and a float control provide an adequate supply of spray water at all times.

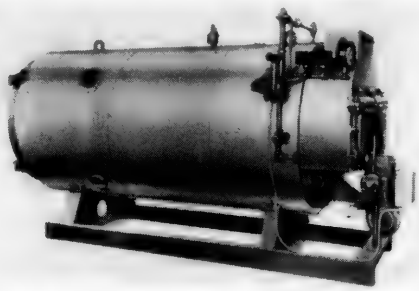
There are 12 different sizes of low pressure units. Capacities range from 600 to 29,000 cfm. High pressure models range from 5,000 to 29,000 cfm and are available in 7 sizes.

More information? Circle Item 6, postcard, last page.

Sixteen Boiler-Burner Units

Factory assembled 18-92 hp boiler-burner units are announced by Kewanee Boiler Div. of American-Standard, Kewanee, Ill., featuring the Kewanee Scottie, Jr. boiler and Iron Fireman burners for gas, oil, or combination gas-oil firing.

The completely integrated units are available in 8 sizes of high pressure packages, 125-150 psi, 18-92 hp,



and 8 sizes of low pressure packages, 15 psi-steam or 30 psi-water, 606,000-3,060,000 Btu per hr.

Automatic forced-draft firing requires only a vent pipe, regardless of boiler room location or atmospheric conditions. Units may be ordered completely assembled—with burner, blower, controls, fittings and trim in place—and fire-tested at the factory; or, the boiler may be shipped first and the burner shipped at a later date for field mounting.

Burner features include complete carbureting of No. 5 oil or lighter and, on combination gas-oil firing, quick fuel changeover by simple valve control. Boiler features include cast iron, insulated flue doors and 3-inch fire tubes set with roller expander and beaded at each end. All boiler materials and construction comply with the specifications of the ASME code. Burner is listed by Underwriters' Laboratories, Inc.

More information? Circle Item 7, postcard, last page.

Bronze Valve Line Expanded

Hammond Brass Works, Hammond, Ind., announces expansion of its line to include high pressure valves for heavy duty industrial, commercial, and original equipment application. In addition, existing items will be introduced in a greater range of sizes, including gate valves up to 3 inches. Company's Brite-Kote process will be featured on all its products.

More information? Circle Item 8, postcard, last page.

Air-Cooled, 50-Ton Condenser

An air-cooled condenser of 50-ton capacity is offered by McQuay, Inc., Minneapolis, Minn. This Model AB Aircon is belt-driven, remote, and is designed for waterless refrigeration and air conditioning. It has a single fan and motor assembly.

Coils are constructed of copper tubes with rippled aluminum fins. An accessory, called Seasontrol, permits top performance in winter as well as summer, the company states. Condensers are designed for multiple circuiting so that two or more separate refrigeration systems can be connected to the same condenser.

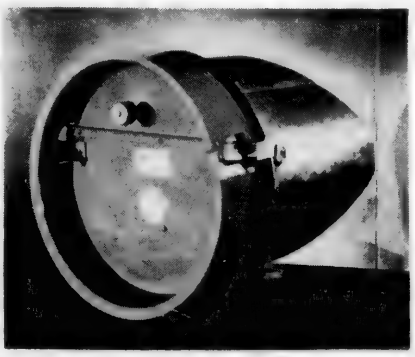
The 50-ton model supplements the company's line that had extended from 2 to 40 tons. The 2, 3, and 5-ton units are direct drive.

More information? Circle Item 9, postcard, last page.

Three-Fuel Draft Control

A three-fuel draft control designed for commercial and industrial applications is introduced by Field Control Division of H. D. Conkey & Company, Mendota, Ill.

The draft control, designated M+MG2, serves gas, oil, oil-gas, or coal with equal efficiency, and requires only minor, on-the-job changes to adjust from one fuel to another. It cannot be obsoleted by fuel change. It serves furnaces and boilers with flue outlets from 10 to 32 inches, both natural and induced draft.



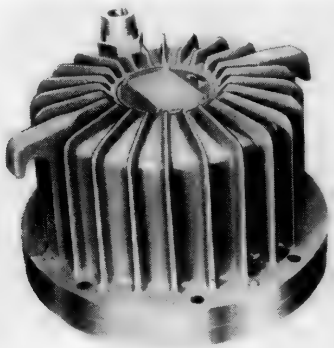
Here is how the draft control operates in a variety of installations: In a coal-fired application, the device serves as a combination barometric draft control and check damper. It can be installed as a reverse-acting or positive-acting Barocheck, manually operated or motorized.

In an oil installation, it serves as a single-acting, barometric draft control, as shown in illustration. For gas, it serves as a double-acting barometric draft control, opening inward to control up-drafts and opening outward to relieve internal pressures. In a gas-oil installation, the only change required in the control, when fuels are interchanged, can normally be made in less than a minute.

More information? Circle Item 10, postcard, last page.

Immersible Motor

The Louis Allis Co., Milwaukee, Wis., announces an immersible motor for submerged operation. The unit is designed for close-coupling to agitators or pumps in sewage sumps, chemicals, water, and abrasive industrial oils.



In pump applications this flange-mounted motor eliminates many connecting components such as intermediate bearings, couplings, shafting, and special bases since the motor shaft is directly attached to the impeller. Motor and pump can be raised and lowered into position together by means of the motor's lifting lugs.

Available in ratings of ¾ to 40 hp, both single and polyphase, model pictured is rated as 1 hp at 900 rpm.

More information? Circle Item 11, postcard, last page.

Packing Cuts Valve Troubles

A plastic-coated packing which adapts valves for use over a 450-deg F temperature range without readjustments is announced by Powers Regulator Co., Skokie, Ill.

Made of Teflon-coated asbestos, packing is expected to reduce valve maintenance and leakage wherever temperature and pressure extremes exist, according to the company. The packing is suitable for temperatures between −50 deg and +400 deg and pressures to 250 psi., without adjustment or repacking, for hot and cold water, steam, air, oil, ethylene, glycol, and similar materials. It can be installed in any valve where standard packing is used, and will work satisfactorily without a stem lubricator.

Along with the packing the company announced a packing gland assembly for better guidance of the stem, said to result in less packing wear and hysteresis.

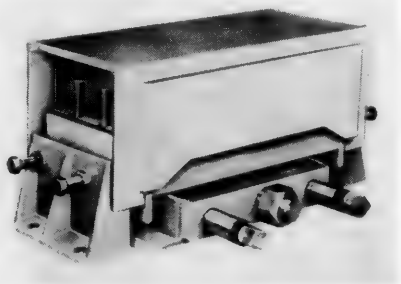
Both the packing and the gland assembly are presently used on company's two-way Flowrite valves and No. 11 regulators with ¼-inch and ⅜-inch stems. Eventually their use will extend to all the company's packed valves.

More information? Circle Item 12, postcard, last page.

Heavy Duty Machinery Mounts

A line of machinery mounts which simplify installation of the heaviest equipment, reduce installation time, frequently eliminate special chassis or foundations, and increase machine life has been developed by The Korfund Company, Inc., Long Island City, N. Y.

The Type SW mounting, a vibration, shock, and noise isolator utilizing steel springs as the isolation



medium, is currently available in 7 load-carrying capacities ranging from 38,000 pounds to 125,000 lb each. Lengths range from 20 to 35 inches; width range from 12 to 20 inches.

The design of this unit, intended for use with heavy, bulky machinery, is claimed by the company to be unique in isolation mounts since it is adjusted and leveled from the side, rather than by means of a bolt protruding from the top. The clean, flat top of the mounting permits placing the unit in any position under a machine base to provide maximum support of the base, regardless of the availability, location, or size of foundation bolt holes.

More information? Circle Item 13, postcard, last page.

Elbow for House Sewers

A 30-deg building sewer fitting, featuring maximum tightness and protection against root penetration, is developed by Johns-Manville, New York, N. Y., to give greater leeway to designers of house sewer systems.

The epoxy-bonded elbow, an addition to the J-M line of Transite building sewer pipe, is made of asbestos-cement. It embodies the Ring-Tite coupling principle that is said to assure maximum tightness by compressing two rubber rings between the pipe wall and the fitting or coupling.

The elbow, which will serve as a companion piece to the 60-deg Transite wye branch for sewer mains, has grooves with factory-inserted rubber rings that lock the sections together. In this manner the ring provides an effective safeguard against the penetration of roots.

With the 11¼, 22½ and 45-deg turns, the 30-deg fitting will allow a greater margin of design freedom in laying out house sewer systems.

More information? Circle Item 14, postcard, last page.

Boiler Water-Level Gage

A steam boiler water-level gage which remains readable under all conditions, cannot explode, and can be utilized to operate controls automatically has been developed by Charles Engelhard, Inc., East Newark, N. J.

Designed for use on ships and in power plants, particularly where steam pressures run in excess of 750 psi, the instrument is similar to conventional gages in size and shape. Instead of a glass or quartz tube, however, it consists of a non-magnetic stainless-steel pipe enclosing a metal float which carries a powerful permanent magnet.

As the float rides up and down on the water in the tube, the magnet acts through the tube walls upon a row of metal reeds mounted beside it. Painted white, each reed can be pulled forward by the magnet so that it comes into view through a window in front of the gage. When the float moves again, the reed recedes out of sight.

In addition to serving as visible indicators of the water level, the reeds can carry electrical contacts which operate automatic water controls or set off alarms. Quick-acting valves at top and bottom of the gage disconnect it from the boiler if a leak or other trouble develops.

More information? Circle Item 15, postcard, last page.

Coils of Any Metal Offered

A new service in the manufacture of coils for various heat exchange duties is announced by Niagara Blower Co., New York, N.Y. A complete range of choice is offered in the metals from which these coils are made.

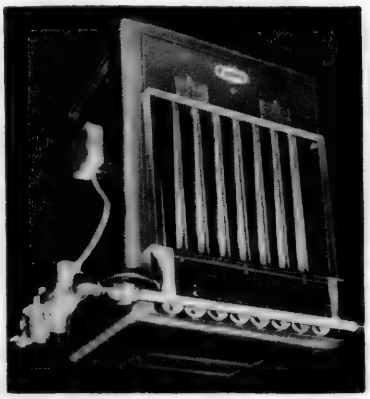
Metals offered include aluminum, copper, stainless steel, carbon steel, alloy steels, and hot-dipped galvanized steel.

Coils are manufactured with both prime surface and extended surface. Types include series flow, serpentine, parallel flow with special headers, and fully cleanable coils. Coils for pressures to 3000 lb are also available.

More information? Circle Item 16, postcard, last page.

Gas-Fired Duct Furnace

Simpler installation in less space is found in a line of AGA-approved, gas-fired duct furnaces announced by Carrier Corp., Syracuse, N.Y. Compactness of the units makes them adaptable for heating in conjunction with air conditioning installations in stores, supermarkets, restaurants, and other low-ceiling structures.



The company says the duct furnaces can be used in existing duct work to inexpensively add heat to an air conditioning system or an undersized forced air heating plant. They are available with an open or encased blower assembly providing flexibility in laying out forced air systems of any capacity.

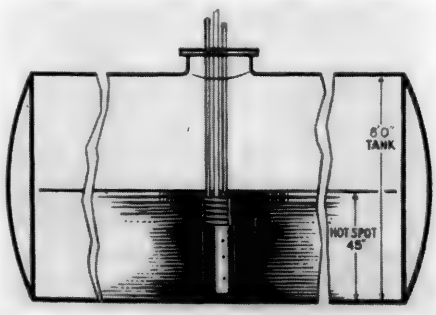
Units are produced in 8 sizes with outputs ranging from 50,000 to 230,000 Btu. They offer gas control lines mounted on either side and low voltage controls operating on either 115- or 230-volt current. The duct furnaces can be installed singly or in multiples to meet heating requirements.

More information? Circle Item 17, postcard, last page.

Pre-Heats Oil in Storage

The "Hot-Spot" is a simple and economical method of pre-heating heavy liquids in the bulk tank before entering the suction line. It is particularly effective for heating No. 5, No. 6, and Bunker C oils, says its manufacturer, Rempe Co., Chicago, Ill.

Unit is a shell and coil assembly and is lowered into the tank through the manhole. Inlet and outlet pipes are



provided for heating by steam or hot water. Holes for supply and return pipes, and fluid suction pipe are made by drilling or torch cutting in the manhole cover.

A flow accumulator causes the heavy oils or other liquids to flow over heated pipes before entering the suction line, making the job of the suction pumps an easy one. The standard unit is furnished with pipes in proper length for any diameter tank. The coil is 1½-inch full weight steel pipe, extending the depth of shell. The shell is 12 gage sheet steel. Accumulator is steel bolted to lower braces. Unit is tested with 400-psi air under water after fabrication. Two sizes are available: 16-inch shell for manholes of 16½-inch opening and larger; 14-inch shell for manhole openings 14½ to 16 inches.

More information? Circle Item 18, postcard, last page.

Medium-Density Polyethylene

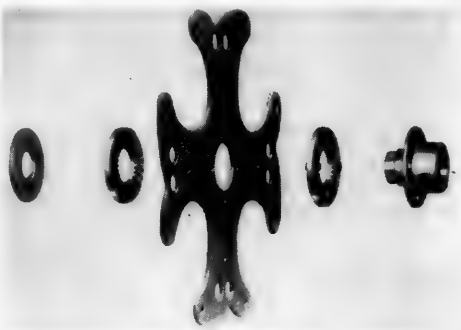
The availability of a new medium-density polyethylene is announced by Eastman Chemical Products, Inc., subsidiary of Eastman Kodak Co., Kingsport, Tenn.

Company states that as compared to low-density, conventional-type polyethylene, the use of Series 100 Tenite polyethylene means greater stiffness, higher heat resistance, and greater resistance to abrasion in molded products. Its use avoids the limpness of some items with thin walls molded from conventional-type polyethylene. Users of extruded pipe will benefit from its ability to withstand higher pressures and temperatures.

More information? Circle Item 19, postcard, last page.

Resilient Fan Hub

A resilient fan hub, now produced as a standard component by Air Impeller Div., The Torrington Manufacturing Co., Torrington, Conn., is said by the company to be the first "soft" hub design to combine superior noise reduction with the highest available starting-torque rating. Noise level tests in company's engineering laboratory have shown the Neoprene hub at least as efficient as the



best available conventional designs in reducing 120-cps noise originating in a-c drive motors. The resilient hub withstands 20 inch-pounds of starting torque, the maximum rating now available.

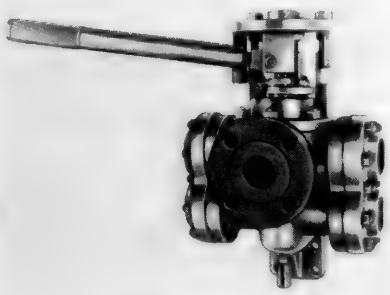
A high-torque type of resilient hub of the same basic design permits starting torques as high as 75 inch-pounds, so that a soft hub can now be used in larger fan sizes. It is expected that the new resilient design will be helpful in promoting higher consumer acceptance of larger home cooling and ventilating fans by providing a commercially acceptable noise level.

The resilient hub, as shown in illustration, includes two ribbed Neoprene pieces and hub retainer.

More information? Circle Item 20, postcard, last page.

Transfer Valve Links Units

A transfer valve for duplexing two strainers, heat exchangers, or other equipment is developed by A. W. Cash Co., Decatur, Ill. Fast and smooth transfer from one unit to another is promised. This Type 45 valve has 6 ports, including a common inlet and outlet. Flow is



through the single inlet, to either of two pieces of equipment, and out the common discharge connection.

A single operating handle jacks up the plug before rotation to make transfer effortless. The plug cannot be rotated until it is clear of the seat, and an indicater shows position of the plug at all times.

Valve is available in two sizes: 1 inch, 600 lb flanged; and 1½ inch, 150 lb flanged; with other sizes upon application.

More information? Circle Item 21, postcard, last page.

Thermal Expansion Control System

A thermal expansion control system, said to replace the conventional expansion tank on hot water heating systems, is announced by American Tube Products, Inc., West Warwick, R. I. Called the Extrol expansion control system, it is designed to eliminate the cause of air troubles in hot water heating systems.

According to the manufacturer, most air troubles in hot water heating systems are caused by expansion air coming into contact with the boiler water at the expansion tank where it is gradually absorbed and carried into the system, thereby causing air troubles unless properly vented and eliminated. Manufacturer's system eliminates the cause of air entering the heating system by embodying a sealed pressurized expansion air chamber, which absorbs boiler expansion, but permits no contact between boiler water and expansion air.

Constructed of two steel hemispheres pressed together with a flexible composition butyl diaphragm between, one side of the diaphragm is charged with air pressure, and the other side has a compression fitting for connection to the boiler. As expansion occurs in the system, the increased volume presses against the flexible diaphragm which absorbs the increased volume in the pressurized expansion chamber area. When the system shuts off, and the temperature drops, the pressurization behind the diaphragm forces the contracting volume of water back into the system. Company claims one unit will accommodate almost every residential or small commercial heating installation, and on larger installations, additional units are added.

More information? Circle Item 22, postcard, last page.

Superheat Thermometer Kit

A thermometer kit designed specifically for checking superheat has been developed by Marsh Instrument Co., Skokie, Ill.

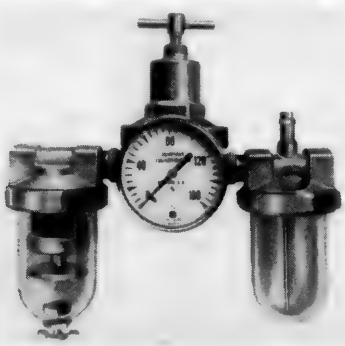
This kit consists of two identical 2-inch dial thermometers in highly polished brass cases having screwed rings and bevelled glass crystals. Dials are graduated from —40 to +65 deg F, and expose calibration screw. Each thermometer is equipped with a 12-inch double armor capillary tube and sensitive bulb only ¼ inch in diameter. A A ring at the top of the thermometer case provides a means of supporting the thermometer.

Completing the kit are two non-absorbent oil-resistant foam rubber wrappers for attaching bulbs to the points of measurement, and also for insulating the bulbs from ambient temperature. Thermometers, wrappers, and instruction booklet are all packed in a clear plastic box.

More information? Circle Item 23, postcard, last page.

Pressure Regulator Assemblies

A recently announced high capacity pressure regulator, manufactured by Generant Engineering Co., Newark, N. J., and designed for pressure regulation of air,



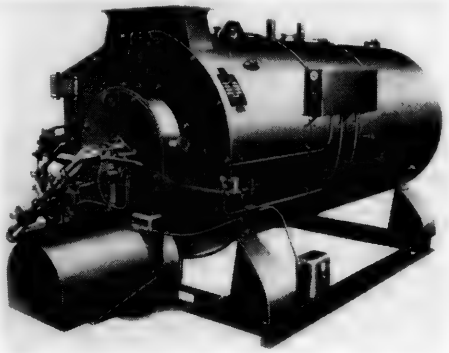
water, oil, and gases, is proving the company states, to be an efficient companion in combination with filters, lubricators, or both as illustrated.

The small proportions of the regulator, low pressure drop, and a new type of venturi, which gives it a capacity many times that of larger units, are finding favor in many installations, company asserts.

More information? Circle Item 24, postcard, last page.

Fire-Tube Hot Water Generators

Specifically designed for, and to eliminate thermal shock in, modern hot water heating systems is a line of packaged fire-tube hot water generators manufactured by Cyclotherm Division, National-U.S. Radiator Corp.,



Oswego, N.Y. This line supplies capacities in a range from 670 through 6700 MBH for standard forced circulation hot water systems, and other models are available for high temperature operation or systems requiring larger capacities.

Lab tested with temperature differentials varying from 2 to 150 deg F, and circulation rates changed to simulate conditions found in field operations, the units operated without any failures and at efficiencies in excess of 80%.

Other features claimed by the company include minimum installation costs and space requirements; interchangeable fuel firing; and a complete control system designed for the hot water generators.

More information? Circle Item 25, postcard, last page.

Low Silhouette Cooling Tower

A compact, low silhouette, general purpose cooling tower with 15-200 gpm capacity is offered by Binks Mfg. Co., Chicago, Ill. Unit measures, depending on capacity, 44-84 inches high.

Compactness is achieved through multi-finned internal decking made of non-corrosive plastic. Notched plastic sheets are said to provide quadrupled water-to-air exposure. No nozzles are required to effect initial water breakup. Water enters at tower top under low pressure. Gravitational flow carries it down over decks mounted in two easily removed drawer-like receptacles at each end of the tower.

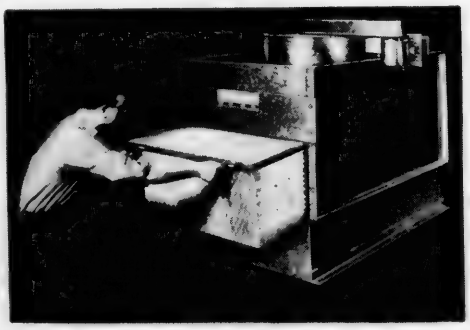


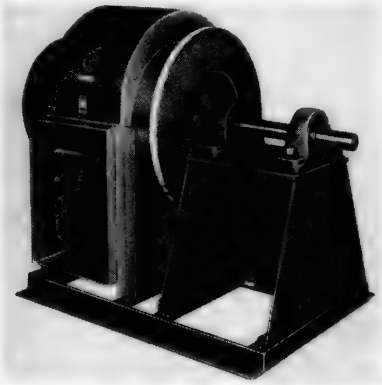
Photo shows workman easily sliding out internal plastic decking for cleaning and servicing. All metal parts are hot-dip galvanized after assembly, so no other surface protection is needed.

Above and between the two decking units is a dynamic and static balanced fan, which draws air up through the decking. Weatherproof motor of the belt-driven propeller fan is mounted outside the air stream.

More information? Circle Item 26, postcard, last page.

High Temperature Fans

A line of high temperature heat fans, called Dura-Temp, is announced by General Blower Co., Morton Grove, Ill. According to company engineers, the design keeps the bearings in cooler operating zones by preventing high temperatures inside the fan from reaching the bearings and causing bearing trouble. A rotating member of dissimilar alloy, fitted to the shaft, radiates and circulates ambient heat away from the bearing areas.



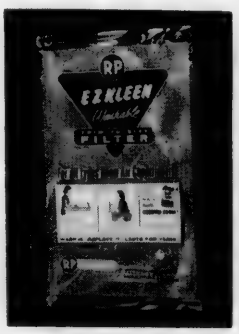
The heat fan line runs from 600 to 30,000 cfm and will handle temperatures up to 1650 deg F. The company guarantees performance, prompt delivery, and full assistance in the application of standard and special high temperature heat fan applications, and any problems related to them.

More information? Circle Item 27, postcard, last page.

Aluminum Filter May Be Cut

Research Products Corp., Madison, Wis., announces development of the E Z Kleen Trim-To-Size air filter for room units.

The filter is of rigid aluminum construction, with its design adapted from the standard filter manufactured by the company. It is furnished in 15 by 24-inch size and can be easily cut with a scissors or knife to the desired size. This easy-cutting feature is also important when the cutting of holes for control knobs or shafts is necessary.

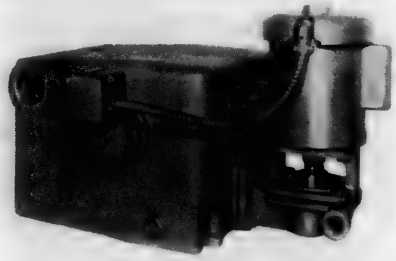


Filter can be easily washed with water and re-installed for constant efficiency. It offers odor-removal with the use of Super Filter-Coat, the company's dirt, pollen, and odor-removing adhesive.

More information? Circle Item 28, postcard, last page.

Larger Condensation Pump

Hoffman Specialty Mfg. Corp., Indianapolis, Ind., announces the addition of a 12,000 sq ft EDR pump to its line of Watchman condensation pumps. Previously, the line consisted of single WC 8-20, and duplex WCD 8-20, 8000 sq ft EDR pumps.



Features of the new pump, WC 12-20, include cast iron receiver, bronze-fitted centrifugal pump, stainless steel pump shaft, quiet 1/3 hp motor, and low inlet.

Additional characteristics include a pump capacity of 18 gpm, discharge pressure of 20 psi, and receiver capacity of 14 gal.

More information? Circle Item 29, postcard, last page.

New Baseboard Model

Added to its line of baseboard radiation by General Heating Products Co., Philadelphia, Pa., is Model RO-1000. The model is available in one style only which makes stocking and inventory no problem.

It may be installed free-standing or recessed into the wall. Enclosure is furnished in 8-ft lengths, and consists of only two pieces—a back and a front plate. Front plate may be easily removed, even when recessed, to permit cleaning of the heating element, which includes 2⅛-inch square fins.

More information? Circle Item 30, postcard, last page.

Plastic Solves Hood Problem

Hetron 92, a fire-retardant polyester resin, is available from Hooker Electrochemical Co., Niagara Falls, N. Y. The plastic's fabrication into fume hoods has proved very successful, the company states.

Picture shows such a hood reinforced with glass fiber mat. Four such hoods, installed in the company's own plant, have been exposed to corrosive conditions for over a year, with no evidence of deterioration reported.

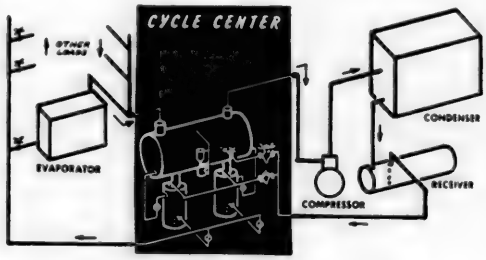
An uncluttered surface is presented to corrosive elements on the hood's underside. Fabricated in three sections, with outside flanges, only 42 uncoated nuts and bolts are required for assembly. Units can be custom fabricated for about eight hundred dollars. Besides being light in weight, they are said to have high impact strength and be virtually unbreakable.

More information? Circle Item 31, postcard, last page.

Refrigeration Control Unit

A central automatic refrigeration control unit, called Cycle Center, is announced by J. E. Watkins Co., Maywood, Ill. It is designed to supply refrigerant liquid to the refrigeration plant at constant pressure and at suction temperature regardless of variations in condensing pressure. Large power savings are said to result.

Power savings result, the company states, because condensing pressures are allowed to fall to lowest oper-



able values obtainable from condensers. Further, by feeding subcooled liquid at constant pressure, a liquid having no bubbles of flash gas will be delivered to each expansion valve in the plant, thus providing the feeding conditions necessary for best coil efficiency and improved compressor operation.

The pressurizing provided by the unit is provided at no extra cost because the liquid is pumped by flash gas obtained from reducing the liquid pressure to the constant value necessary to feed the plant. Unit is supplied for any plant system of 8 to 1000 tons or over.

More information? Circle Item 32, postcard, last page.

Self-Closing Relief Valves

Watts-O-Matic Series 444 low-cost, self-closing temperature and pressure relief valves are offered by Watts Regulator Co., Lawrence, Mass.

Series is comprised of models with or without a test lever, and with short or extension-type thermostat with AGA water temperature rating of 200,000 Btu per hr. They are designed to provide fully automatic temperature and pressure relief protection to applications where similar but semiautomatic (fuse plug type) valves were previously used.

In spite of their moderate cost, the company states, these valves contain a solid wall thermostat, which is said not to be affected by scale or corrosion. Construction is all bronze with stainless steel spring. Sizes: ½-inch or ¾-inch male inlet and ½-inch female outlet connections.

More information? Circle Item 33, postcard, last page.

(Continued on page 120)

Sarco offers you this big Plus . . .

Complete Quality Lines of

SARCO RADIATOR VALVES

for steam and hot water

PLUS THE ADVANTAGES OF UNDIVIDED RESPONSIBILITY

. . . for these radiator valves and a wide variety of other steam and hot water heating specialties.

What do you look for in radiator valves? Extra dependability? Long life and easy maintenance? Fine workmanship? You get all of these advantages in Sarco Radiator Valves . . . made to traditional Sarco high quality standards.

No matter what your need . . . there is a Sarco Radiator Valve to meet it. For steam . . . Bellows-Packless, Spring-Packless and Gland-Packed types. For hot water . . . Spring-Packless and Gland-Packed types.

Globe, angle, and corner patterns. Gate type. Modulating and quick-opening. For various pressures up to 150 psi.

Write for Bulletin 150-B

Contains complete information about these quality radiator valves and their many design and construction advantages.

For Sarco Undivided Responsibility—for the convenience and dependability it insures—specify and order from one "Complete Line" source . . . SARCO-SARCOTHERM . . . radiator valves and traps, balancing fittings, and many other heating specialties. Write for bulletins.

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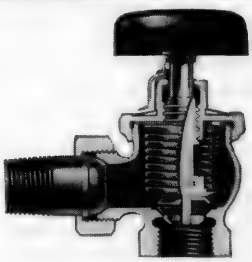
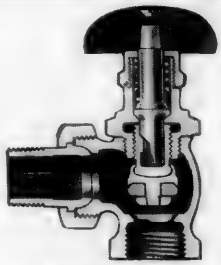
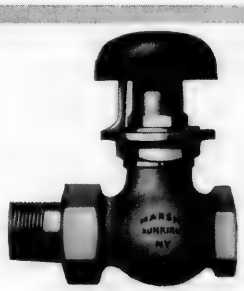


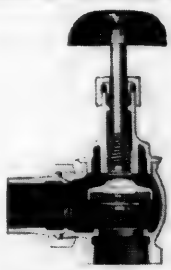
Sarco No. 45
Bellows-Packless Steam Radiator Valve
Modulating Type



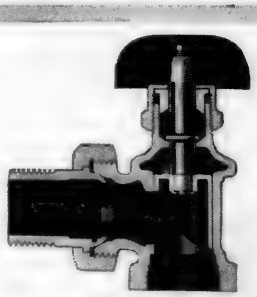
Sarco No. 1141
Spring-Packless Steam Radiator Valve
Quick-Opening Type
(Also, for hot water, No. 1137)



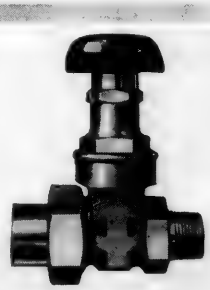
Sarco No. 1247
Spring-Packless Steam Radiator Valve
Modulating Type
(Also, for hot water, No. 1239)



Sarco No. 1126
Gland-Packed Steam Radiator Valve
For 125 psi



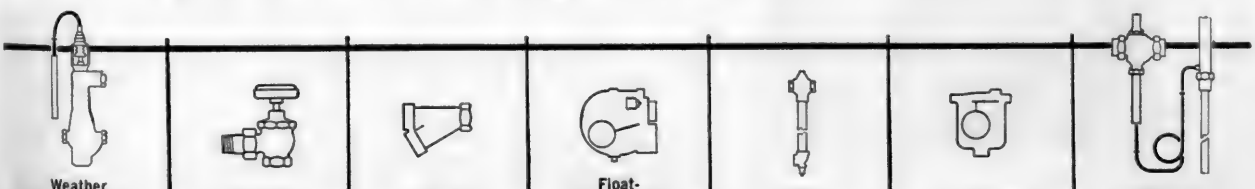
Sarco No. 157
Gland-Packed Hot Water Radiator Valve
Sleeve Type



Sarco No. 129
Spring-Packless Convector
Gate Valve

2223-B

PRODUCTS YOU CAN REST YOUR REPUTATION ON



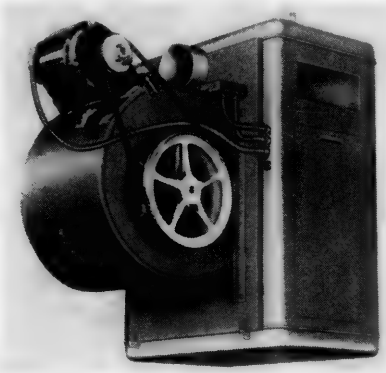
Weather Compensation Control Systems | Radiator Valves • Traps | Strainers | Float-Thermostatic Traps | Water Blenders | Air Eliminators | Self-Operated Temp. Reg.

(Continued from page 118)

Blower-Type Unit Heaters

Modifications for improved appearance, greater ease of installation, and an increased range of applications have been made in Series US-B blower-type gas unit heaters manufactured by Reznor Manufacturing Co., Mercer, Pa.

For improved appearance, all controls and connections are now concealed within the heater casing. For convenience in installation and service, the entire control assembly is located on one side of the heater, easily accessible through a large snap-out panel.



All heaters are now shipped completely assembled, ready for installation instead of having heater, blower and blower motor shipped in separate crates. It is estimated that factory assembly will result in a savings of as much as one hour per heater on installation time.

All units in the standard series are now equipped and A.G.A. approved for use in duct systems with static pressures up to .2 inches. Previously, high-static units were available on special order only.

More information? Circle Item 34, postcard, last page.

Foot Shears Modernized

Modernized for utmost accuracy and operating ease, Series F and Series G foot squaring shears now incorporate the latest design features, according to the manufacturer, Niagara Machine & Tool Works, Buffalo, N. Y.

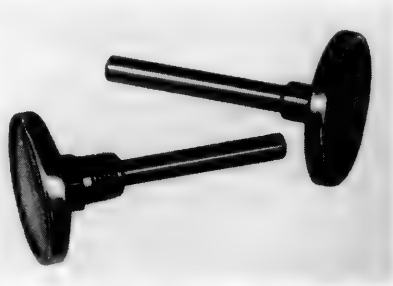
Developed for smooth, one-man operation, shears offer powerful, well-balanced treadle action, positive acting holddown, smoothly functioning counter-balance springs and longer lasting knives, company states. Clear visibility of the cutting line facilitates safer, more accurate shearing.

Series F shears, illustrated, are available in 9 models with cutting lengths from 22 to 120 inches and capacities of 16 and 18 gage. Series G with 18-inch gap includes 5 models—36 to 72 inches with 16 gage capacity.

More information? Circle Item 35, postcard, last page.

Thermometer in Eleven Ranges

Addition of a new thermometer to its line is announced by W. C. Dillon & Co., Inc., Van Nuys, Calif. The unit, Model G, has a head diameter of $1\frac{11}{16}$ inches and is suited for installation on any type of equipment where mounting space is limited.



Built on direct drive, bi-metal coil principal, it is constructed entirely of stainless steel except for aluminum and black crystal-protected dial. All models are moisture sealed, overheat protected, and individually calibrated for peak accuracy.

Eleven ranges available are 0 to 200 deg F, 25 to 125 deg, 50 to 300 deg, 50 to 500 deg, minus 40 to 160 deg, 150 to 750 deg, 200 to 1000 deg, minus 10 to 110 deg C, 0 to 100 deg C, 0 to 150 deg C, and 0 to 300 deg C. Model can be supplied with stem length as short as $2\frac{1}{2}$ inches or as long as 72 inches.

More information? Circle Item 36, postcard, last page.

Motor Length Reduced

Fractional horsepower motors using Perma-wick, a new oil wicking material, are available from the Westinghouse Electric Corp., Pittsburgh, Pa., for fans and air conditioners. With the material, a specially processed cellulose fiber, the motors are shorter, but are still guaranteed for five years' use without lubrication.

The five-year guarantee is still possible with a smaller lubricating space since the wick will hold more oil per volume of material than felt. It also has better oil retention at normal operating temperatures, the company states.

Wick has a grease-like appearance and is inserted in motor end shields like grease. In combination with one felt wick, it replaces the present assembly of four felt wicks, reducing the motor length.

Ratings of motors using the new lubricating range from 1/80 to 1/6 hp for shaded-pole types; and from 1/20 to 1/3 hp in the permanent split capacitor types.

More information? Circle Item 37, postcard, last page.

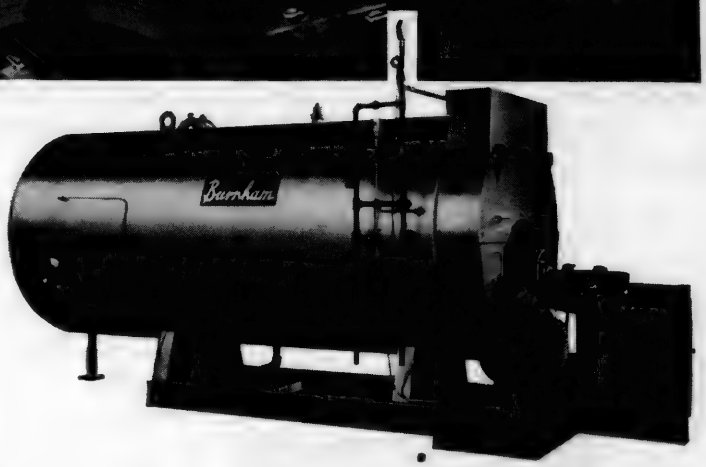
(Continued on page 122)

THE BIG ONES COME TO BURNHAM

LATHAM CORNERS SHOPPING CENTER, ALBANY, N. Y.

HOWARD T. FISHER & ASSOC.
W. O. BIERNACKI-PORAY & ASSOC. } ... *Architects*
SIDNEY W. BARBANEL ..... *Mechanical Engineer*
THE J. M. FINK COMPANY, INC. ..... *Heating Contractor*

5 BURNHAM STEEL BOILERS HEAT THIS HUGE SHOPPING CENTER



This outstanding shopping center uses 3 packaged Scotch Type Boilers, one Standard Scotch Type Boiler and one Compact Type popular Burnham welded Steel Boiler, standard for over 25 years. The Scotch Type Boiler and combustion unit (see illustration) were teamed after consultation with many experts plus extensive testing. The result . . . a fine Burnham Boiler with the finest and most suitable combustion unit. Scotch Type, capacities 2,600 to 35,000 sq. ft. E.D.R. steam and 4,680 to 56,000 sq. ft. E.D.R. water Net S.B.I. ratings. Compact Type 2,600 to 35,000 sq. ft. E.D.R. steam. Comparable ratings for water, all S.B.I.

Stock Boilers Available for Prompt Shipment

Burnham Corporation

Steel Boiler Department
Irvington, New York
Sales Representatives throughout the U.S.A.

Burnham RADIANT HEATING SINCE 1871

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Burnham Corporation ACH-28
Steel Boiler Dept.
Irvington, New York

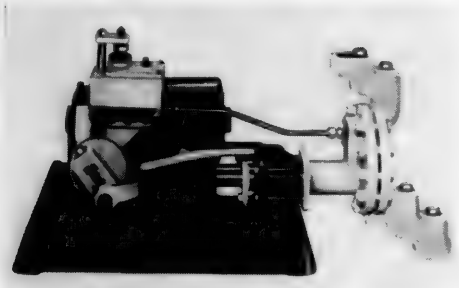
Please give me, without obligation, full ratings and data on:
Scotch Type Boilers ☐ Boiler-Burner Packages ☐ Compact Boilers ☐

Name .....
Address .....
City ..... State .....

(Continued from page 120)

Chemical Metering Pump

For metering toxic, obnoxious, corrosive, and costly chemicals, Milton Roy Company, Philadelphia, Pa., has introduced a new controlled volume diaphragm pump. Retaining the company's Step-Valve liquid end as well as other features of the standard line with which it is interchangeable, these controlled volume pumps have



Teflon diaphragms sealing the liquid ends from the plunger and housing.

Accurate to within plus or minus one percent, they are positive displacement metering pumps. The plunger displaces hydraulic fluid which in turn strokes the diaphragm to impart pumping action through double ball checks. There is no mechanical connection between the diaphragm and the plunger.

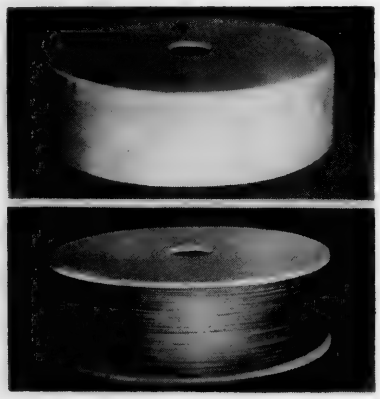
Available with maximum capacities to 138 gph and pressures to 2000 psi these diaphragm pumps have manual or automatic capacity adjustments from 0 to 100%.

More information? Circle Item 38, postcard, last page.

Disposable Reels for Copper Tube

Disposable cardboard reels holding copper tube for air conditioning and refrigeration uses are now available. The lightweight reels, introduced by Chase Brass & Copper Co., Waterbury, Conn., offer many advantages in economy, ease of handling, and added protection of tube.

Less than one-tenth the weight of conventional steel reels, the cardboard reels eliminate many of the problems



and expenses associated with the metal units, according to the company. Purchasers of copper tube no longer have to perform the bookkeeping involved in accounting for the reels and the required deposits on their return. Also eliminated are the time and labor of handling the empty reels, storing them prior to shipment, and then shipping them back.

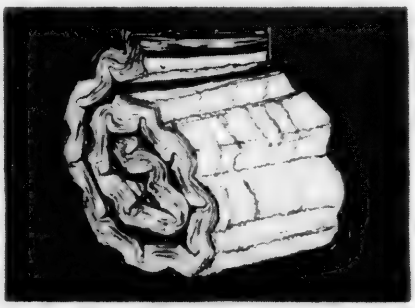
The disadvantages of metal reels have prevented many users of copper air conditioning and refrigeration tube from availing themselves of the advantages of extremely long, continuous, non-welded lengths of tube. The new disposable reels may contain a single length of tube from 2000 to 3000 ft in ¼- and ⅜-inch OD, and 1500 to 2000 ft in ½-inch OD.

Illustrated at top of photo is a disposable reel with tube protected for shipment; below, tube is exposed.

More information? Circle Item 39, postcard, last page.

Flexible Insulation

A flexible pipe insulation material said to have high impact strength and to require no pre-forming is available from Saflex Div., Safpac Corp., San Gabriel, Calif.



Trade-named Saflex, the material consists of compressed glass fibers controlled in orientation and distribution.

A special corrugating process provides 360-deg flexibility. Material is available in a wide range of thicknesses, fibers, binders, and densities and can be designed to withstand temperatures to 1000 deg F. Plies of foil or film may be included to provide sandwich design.

More information? Circle Item 40, postcard, last page.

Variable-Pitch Sheave

A compact S-section Vari-Pitch sheave said to permit wider speed changes and increased horsepower transmitting capacity is announced by Allis-Chalmers Mfg. Co., Milwaukee, Wis.

The single-groove S-section sheave has a range of 5.5 inches minimum to 120 inches maximum. It complements the present wide range Q- and R-section Vari-Pitch and companion sheave line.

Companion sheaves with company's Magic-Grip bushings in sizes from 8.0 to 24.0-inch pitch diameter are available along with S-section belts in lengths from 54 to 150 inches. The S-section belt has a maximum width of 2-1/16 inches which is wider than Q- or R-section units.

The S-section sheave requires no more mounting space than is needed for the smaller R-section, one-groove sheave.

More information? Circle Item 41, postcard, last page.

(Continued on page 124)

"Now we can get rid of that stack"

New Petro FORCED DRAFT burner for smaller boilers (OIL, GAS OR COMBINATION GAS-OIL)

This advanced Petro forced-draft burner is as compactly built and service-free as your home oil burner; yet it delivers some surprising extra values.

First, built into it is a complete combustion system, with forced draft air supply, fuel systems and prewired integral control panel—all assembled and tested at the factory.

Second, it eliminates the need for a high stack, yet requires no induced draft fan.

Third, a burner head of new design cures the old problem of flame pulsation, in both gas and oil firing—in either natural draft or pressurized boilers.

Finally, it is available for either light oil or gas firing—or a combination of both—with instantaneous change of fuel under either automatic or manual control.

Available as a complete burner unit for easy application to any type of boiler, from 18 to 92 bhp. Also available in a complete boiler-burner unit (with Scotch boiler) delivered at site, ready for service connections. For full description and specifications, please mail coupon.

See Petro Catalog in Sweet's Architectural File

Makers of Quality Heating and Power Equipment since 1903

PETRO

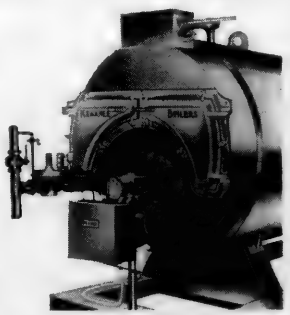
T. M. REG. U. S. PAT. OFF.

Forced draft... no stack or induced draft fan required.

No flame pulsation.

Single or dual-fuel firing.

Complete unit with Scotch boiler; or burner only for use with any type boiler.



PETRO
3225 West 106th Street
Cleveland 11, Ohio
(In Canada: 80 Ward Street, Toronto, Ontario.)

Please send me information on Petro P-240 Forced Draft Gas-Oil Burner.

Name .....

Company .....

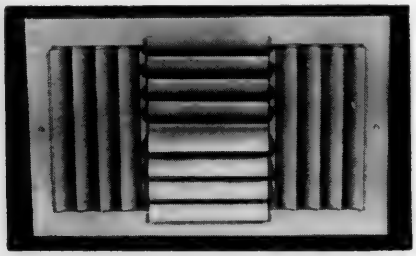
Address .....

City ..... State.....

(Continued from page 122)

Four-Way Registers

A line of grilles and registers with adjustable curved louvers of extruded aluminum is manufactured by Waterloo Register Co., Inc., Waterloo, Iowa. The louvers can be arranged to provide 4-way flow of air from one register. The complete line includes grilles and registers

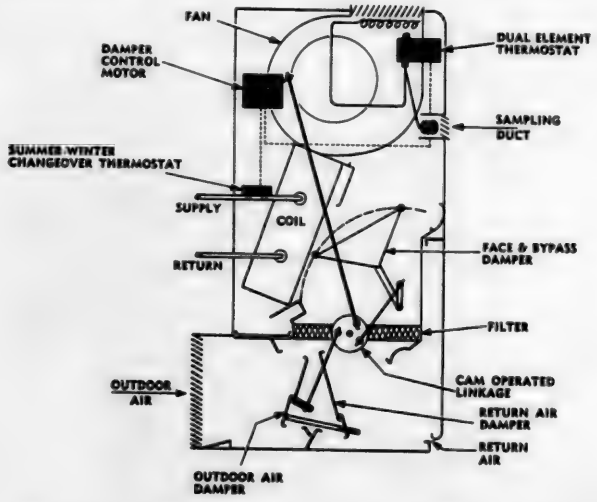


for one-way flow either horizontal or vertical, simultaneous two-way flow horizontal or vertical, three-way flow, horizontal to the right and left and either up or down from the center group of louvers. In addition, straight adjustable extruded aluminum louvers can be furnished mounted behind the curved louvers to increase the control over air flow.

More information? Circle Item 42, postcard, last page.

Automatic Control Package

An automatic control package specifically designed for controlling combination hot and chilled water unit ventilators is offered by Barber-Colman Co., Rockford, Ill. Package combines a dual element, unit-mounted room and discharge controller, an oil-submerged spring return motor operator, and a change-over thermostat. The result is a precise control system which the company states will provide the right room and discharge temperatures in classrooms at moderate cost.



Package consists of two pre-wired assemblies, equipped with plug-in cables to facilitate installation. Change-over from heating to cooling is automatic. Strap-on thermostat senses whether hot or cold water is being supplied, activating the system accordingly. The dual-element thermostat, mounted within the unit, is immune to tampering by unauthorized persons and chalk-dust and dirt problems. There is also the advantage of not having to find wall space for mounting it.

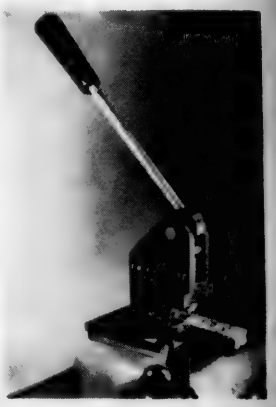
ASHAE cycles *X* or *Y* can be achieved through a single control motor operating the standard cam-operated linkage to sequence the outside-air, return-air, and face and bypass dampers. Standard linkage is available for fixed percentage minimums of 0, 20, 25, 33-1/3, 50, and 100.

Entire package is installed on the unit ventilator at the factory, but company's local agent assumes responsibility for operation. Data sheet F 8527 has full details.

More information? Circle Item 43, postcard, last page.

Quick Flaring Tool

Announced by J. & J. Manufacturing & Sales Corp., San Marino, Calif., is a precision built flaring tool called Kwik-Flare. Tool is said by the company to offer a new method of fast, efficient tube flaring and to increase flaring efficiency 600%.



Spring and lever operated, lightweight tool may be bolted or C-clamped to bench or vise-mounted. Flaring bar and tubing are secured in flaring position by means of quick-closing cam locking device which is part of flaring tool. A self-centering flaring cone is said to insure perfect, uniform flares in seconds by direct, positive compression.

Accommodating copper, brass, aluminum, and soft steel tubing, the tool produces both 45 deg and 37 deg flares by simply changing flaring cone and using proper side of flaring bar.

More information? Circle Item 44, postcard, last page.

Tension-Control Motor Bases

A re-engineered line of Econ-O-Matic motor bases announced by American Pulley Co., Philadelphia, Pa., provides complete automatic tension control of short-center belt drives up to 250 hp.

Motor bases automatically control belt tension by harnessing the reaction torque inherent in every motor to provide exactly the right tension on the belts at every instant, the company states. Drive efficiency is increased and belt life is lengthened.

Three new sizes accommodate the new and old NEMA-frame motors up to and including 30 hp. By means of tabular data included in the company's motor base catalog, No. MB-57, selection of the correct base is made easily and quickly. Other models listed cover sizes up to 250 hp.

More information? Circle Item 45, postcard, last page.

(Continued on page 126)

Specify RECO

D. C. Hospital Center, Washington
Mechanical Contractor:
Standard Engr. Co., Inc., Washington, D. C.
RECO Representative:
Meloney Engr. Co., Washington, D. C.

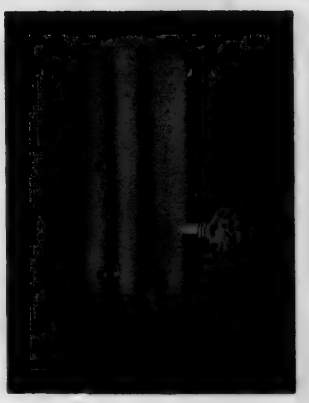
RECO Hot Water on Duty at D. C. Hospital Center!

When three Washington hospitals merge into one huge D. C. Hospital Center, the hot water demands will be enormous.

RECO hot water storage heaters and tanks were designed to meet and beat these hot water needs. Twenty-nine pieces of RECO heat exchange equipment will keep thousands of gallons of hospital-pure hot water always on tap for the new 800-bed center. Hundreds of hospitals from coast to coast now rely on round-the-clock hot water service by RECO.

Let *RECO* fill *your* hot water needs. On your next job—specify the full line of RECO Hot Water Storage Heaters, Convertors and Instantaneous Heaters.

For name of nearest RECO representative, write Dept. R, RECO, 7th & Hospital Sts., Richmond 5, Va.



RICHMOND ENGINEERING CO., INC.

(Continued from page 124)

Fixed-Cone Diffuser

A fixed-cone diffuser, Model E-3, is announced by Carnes Corp., Verona, Wis. It has a deep outer ring that is said to eliminate smudging and aging, and three inner cones, instead of two, which tend to eliminate see-through.

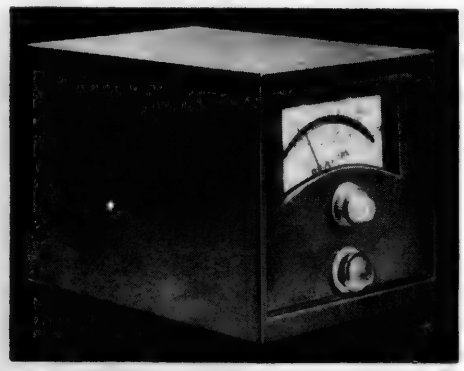
The three inner cones are removed for installation purposes. Diffuser is recommended for either flush or stub-duct mounting. A rubber gasket is standard in all sizes. A standard finish, designated F-4, is a baked metal-escent aluminum enamel, applied over a phosphated priming, and designed to last the lifetime of the building. Other finishes are available.

More information? Circle Item 46, postcard, last page.

Simpler Contact Meter-Relay

Addition of a condenser, a resistor, and a 300-volt diode to one of its circuits has resulted in a greatly simplified proportioning control that will maintain temperatures within 1 deg F and level them out to an extent heretofore impossible, says its manufacturer, Assembly Products, Inc., Chesterland, Ohio.

This addition to the company's Simplytrol line may be used in almost any application where heating or cooling is involved, as, for instance, in the maintenance of refrigerant temperature in a condensing unit. It is a



contact meter-relay. Its adjustable pointer is set anywhere on the dial corresponding to the temperature to be maintained. The other pointer fluctuates with a signal generated by a thermocouple. There is no intervening amplifier, a fact which is said to eliminate distortions in the input signal which often occur when they are used.

Key to the leveling out operation of this control is an electrostatic charge between the contacts of the meter-relay which builds up while the pointers are apart and when a slave relay has actuated the mechanism being controlled. As the moving pointer returns to the control point, the electrostatic attraction will pull it in prematurely, eliminating the tendency to override.

More information? Circle Item 47, postcard, last page.

Pipe Covering Speeded

Development of No. 101 pipe insulation, a speed-fastening, high-temperature pipe covering, is announced by the Baldwin-Hill Co., Trenton, N. J. Built-in tie wires permit application to large-diameter lines at a rapid rate.

Felted from high-temperature, moisture-resistant, spun mineral wool, insulation will withstand temperatures to

1200 deg F. Its exterior surface is faced with a metal fabric of 16-gage wires welded in a 2 by 2⅝-inch rectanguler mesh and held in place by 16-gage wires tied through the spun wool to an inner facing of 1-inch expanded metal lath. Speed fastening on the pipe is accomplished, as shown in the photograph, by hooking seven wires which extend from one end of the outer mesh fabric under the opposite stay wire and bending them over and back.

Insulation is said the be especially well suited for covering nested pipes and steam traced lines (as in photo) since it can be manufactured to fit exactly with no waste material. Having a low alkalinity factor it will not corrode pipes in the presence of heat and moisture. It is available in 2-ft sections and 1½- to 4-inch thicknesses for pipe sizes from 4 to 36 inches.

More information? Circle Item 48, postcard, last page.

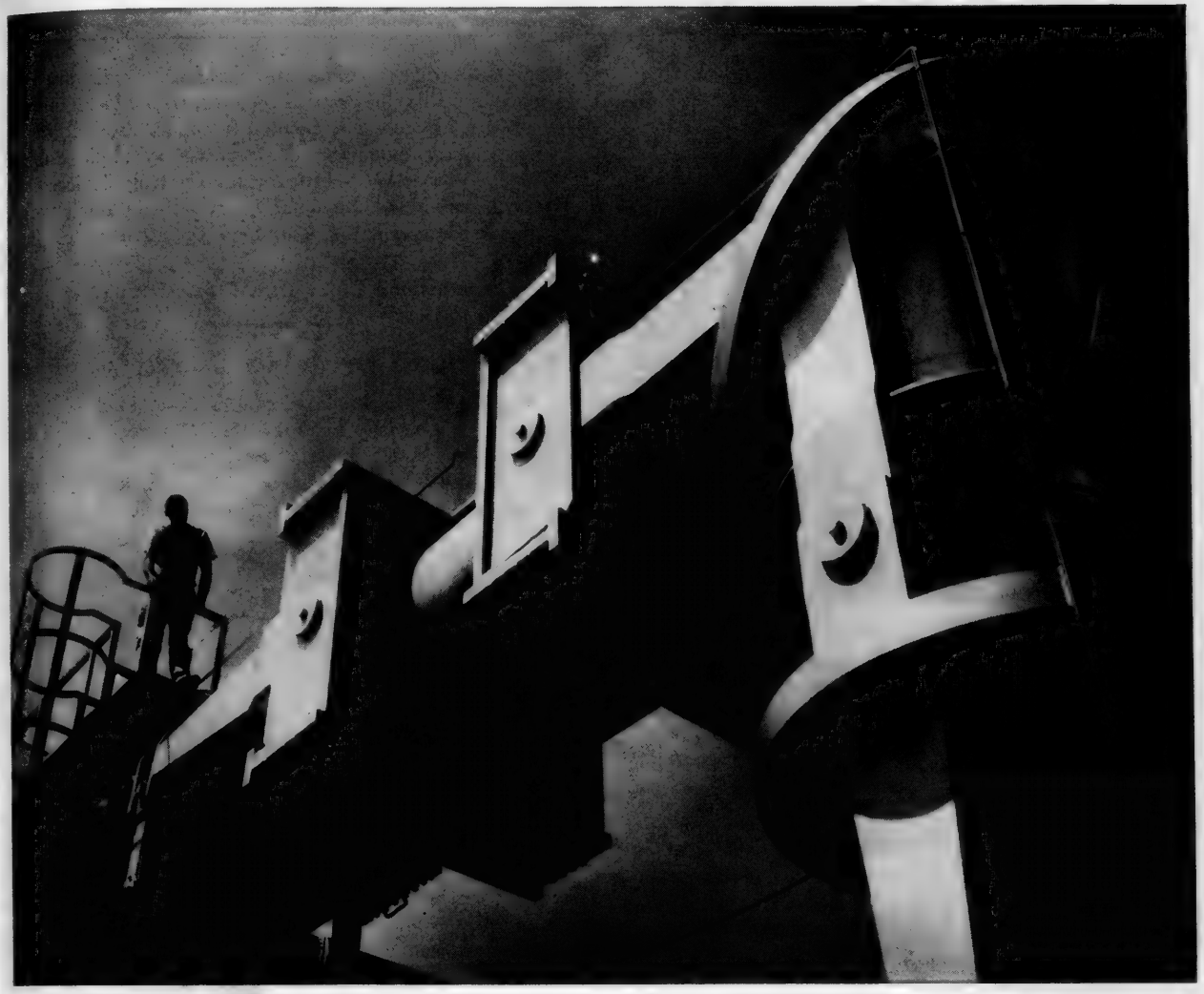
Low Compression Brass Valves

Addition of a line of low compression valves, both stop and stop and waste, cast in brass, is announced by Lee Brothers Foundry Co., Anniston, Ala. Hand wheel is of aluminum and is green plasticized.

Each valve is finished for fine appearance and tested under 100 psi. All washer screws are stainless steel. Washer is of Buna-N to resist oil, chemicals, high temperatures, and deterioration. The nut immediately below the valve handle is packed with asbestos that is impregnated with graphite.

More information? Circle Item 49, postcard, last page.

(Continued on page 128)



MACH 5...

with the help of

ADSCO CORRUFLEX EXPANSION JOINTS

ADSCO DIVISION
20 MILBURN STREET
BUFFALO 12, NEW YORK

YUBA

YUBA CONSOLIDATED INDUSTRIES, INC.

Wind rushing through a wind tunnel at the Arnold Engineering Development Center, Tullahoma, Tenn., reaches a speed of five times the speed of sound. That is 3800 miles an hour. Under this condition, this Air Force Research and Development Command Center can test aircraft, missiles and projectiles under simulated characteristics of high-speed flight.

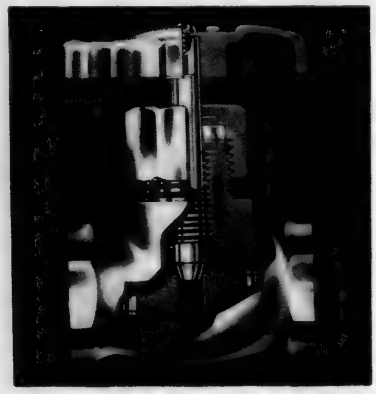
But the air-supply ducting grows and twists under the high temperatures and pressures of the air rushing inside. Something must absorb this movement occurring in three directions, or the ducting would buckle. Easily and efficiently, the movement is absorbed by a combination of Adsco Corruflex Hinge and Universal Expansion Joints, shown above in a section of the ducting.

The design and development of these expansion joints to customer's specialized requirements is only one of the many engineering feats performed by Adsco in recent years. Consult Adsco the next time you need help on piping engineering.

(Continued from page 126)

Globe-Type Needle Valve

Designated Type N-28, a globe-type needle valve is introduced for use as a gage or for metering service in gas, oil, water lines, or other similar uses by Kerotest



Mfg. Co., Pittsburgh, Pa. It has been developed to provide a high-quality, economical valve for applications where space is a factor and where operating areas are close as in meter boxes, pressure gage controls, laboratories and sampling valves.

Valve has a one-piece, solid, forged carbon steel body with a 12/14 chromium heat-treated stainless steel stem with Teflon packing. It is available in sizes of ⅛, ¼, ⅜, and ½ inches. It has a maximum working pressure of 10,000 psi at 70 deg F, and a maximum operating temperature of 500 deg.

More information? Circle Item 50, postcard, last page.

Small-Size Induction Units

Four small-size, high-pressure induction units for perimeter air conditioning in high velocity central systems, in capacities from 2,000 to 12,000 Btu per hr, are available from The Trane Co., La Crosse, Wis., for spaces that do not permit installation of the standard-size models.

Included are a 12-inch vertical cabinet to be installed beneath low sills and picture windows, a 12-inch vertical

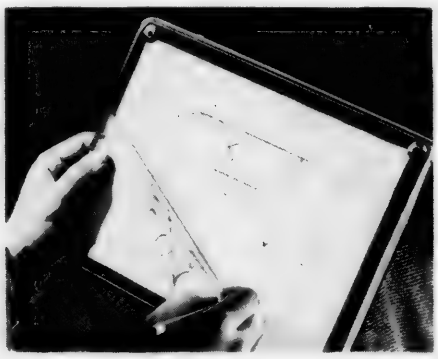
model for concealed installation at the floor level, a 10-inch deep horizontal cabinet model for ceiling installation, and a 10-inch horizontal unit for concealed installation above ceilings.

Four-way directional grilles may be rotated for the desired air discharge pattern. Reversible coils are one row deep in the direction of air flow, with 144 aluminum fins per ft mechanically bonded to copper tubes. Formed steel primary balancing damper has synthetic rubber blade, positive lock adjustment. Control devices are factory assembled pneumatic or self-contained valve packages designed for simplified, positive water flow control.

More information? Circle Item 51, postcard, last page.

Half-Pound Drawing Board

A portable plastic drawing board, molded of high-impact polystyrene, weighs less than 8 ounces. Available from Leslie Creations, Lafayette Hill, Pa., it comes with a 30-60 and a 45 deg triangle, two retractable metal straight edges that eliminate the T-square, and four



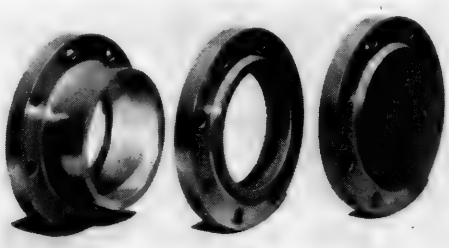
recessed spring clips that hold standard 8½ by 11-inch paper without thumbtacks or other holding device.

Triangles clamp to underside of board when not in use. Rubber cushions protect desk top. Because board is translucent, tracing is possible by holding against window or other light source. Measures 10 by 12 inches to fit in briefcase. Sells for about five dollars.

More information? Circle Item 52, postcard, last page.

PVC Pipe Flanges

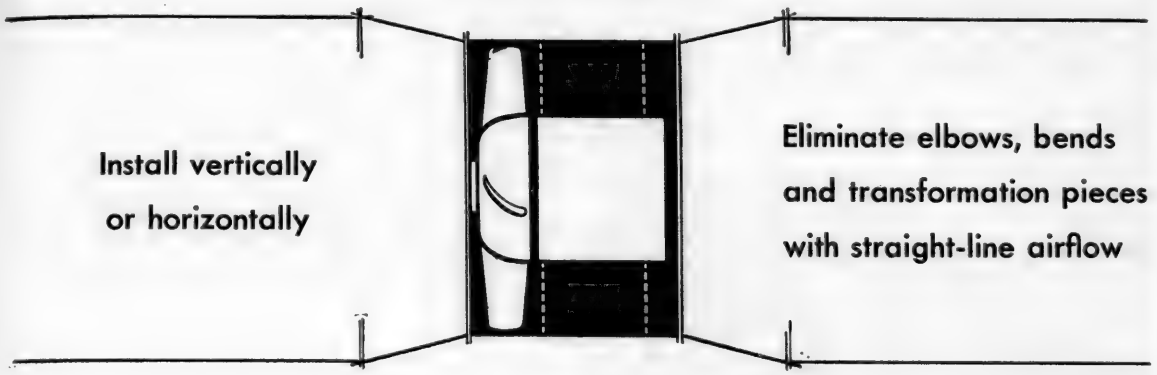
Molded 6 and 8-inch rigid polyvinyl chloride pipe flanges as shown are in production by The Luzerne Rubber Co., Trenton, N. J., for use in PVC and other plastic pipe installations.



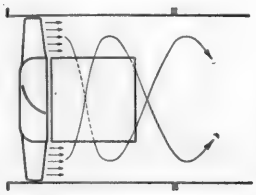
Threaded, socket, blind and reducing flanges are available in both 6 and 8-inch size of Type I (normal impact) or Type II (high impact).

More information? Circle Item 53, postcard, last page.

(Continued on page 130)

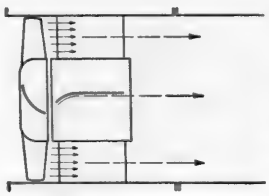


Large-diameter hub and die-formed blades insure uniform air velocity from hub to tip.



TUBEAXIAL

Air discharge follows a spiral path, then straightens out a short distance from fan at moderate pressures.



VANEAXIAL

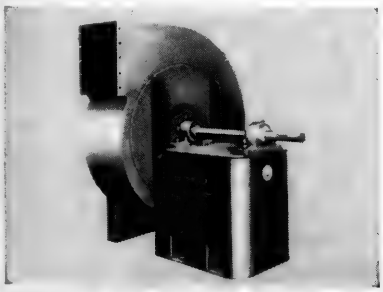
Air discharge is transformed into useful energy by directional guide vanes, increasing efficiency, pressure.

American Blower axial fans deliver the volume you need; fit the space you have!

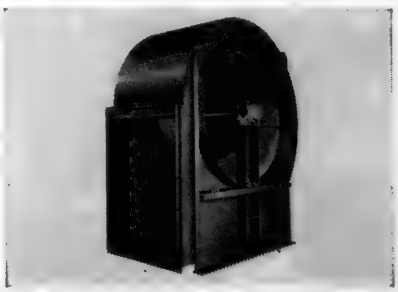
Whatever your air-moving problem — ventilating, heating, drying or processing — you'll find an economical solution in the complete line of precision-built American Blower fans. *Plus-value:* Rugged construction of every American Blower fan gives you extra years of low-cost service with minimum maintenance.

Seventy-three American Blower branch offices from coast to coast — are staffed by skilled sales engineers. Ask them to help you select the right equipment for *your* job. Call today! American-Standard, American Blower Division, Detroit 32, Michigan. In Canada: Canadian Sirocco products, Windsor, Ontario.

It pays to standardize on American Blower fans for every duty!



Industrial Fans—three wheel-options



HS Fans — nonoverloading, minimum power

Sirocco Fans—low speed, quiet operation

AMERICAN-Standard
AMERICAN BLOWER DIVISION

(Continued from page 128)

Hot-Cold Beverage Machine

Addition of Model A5 PR-HC to its Kelvinator All American series of beverage dispensers is announced by The Ebco Mfg. Co., Columbus, Ohio. This pressure type unit has a refrigerated compartment and two ice cube trays.

Unit is for serving instant coffee, hot chocolate, and powdered soups. Refrigerated compartment holds iced drinks, as shown in illustration.

Referred to as the Hot 'N Cold, it is marketed under the Oasis trade name as well. Cool water is 50 deg F, hot water, 180 deg. The company also makes an in-the-wall electric water cooler that is applicable to any building.

More information? Circle Item 54, postcard, last page.

Lead Vapor Detector

Hazardous concentrations of poisonous lead vapors in occupational areas can be determined with Lead-in-Air detector kit offered by Mine Safety Appliances Co., Pittsburgh, Pa. Spot test color comparisons reflect concentrations of lead either below or above the maximum allowable concentration of 0.20 milligrams per cubic meter.

Kit consists of lightweight, portable aluminum case which suspends from a shoulder strap to waist height, a 500 ml sampling pump, 2 boxes of glass fiber filter discs, a pair of tweezers for handling filter discs, a kit containing two sets of reagents, and color standards.

More information? Circle Item 55, postcard, last page.

Extended-Shaft Fan

Development of an extended shaft orifice ring fan, designed for operations where the motor must be kept out of the air stream, is announced by Chicago Blower Corp., Franklin Park, Ill. This Type ES fan is basically designed for exhausting gases or corrosive fumes but may be used to circulate high-temperature air for drying.

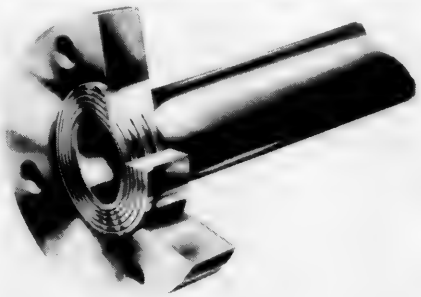
Aerodynamic blade design results in fan-wheel production of high-pressure characteristics with maintenance of a low noise level. Blade angles, large at the hub, decrease to small values at the tips for uniform air pattern. Steel or aluminum wheels, depending upon individual specifications, are available with 2, 4, 6 and 8 blades. Fan sizes range from 24 to 42 inches.

Ball bearing motors, used in all models, will operate in horizontal or vertical position. Packed with high-temperature grease, the bearings will operate in temperatures up to 250 deg F. In addition, the steel enclosed, turned, ground and polished shaft utilizes flexible type couplings for longer wear.

More information? Circle Item 56, postcard, last page.

Lightwall Flanged Fitting

A stainless steel serrated insert with carbon steel flange is announced by Speedline Div., Horace T. Potts



Co., Philadelphia, Pa. It is designed specifically for use with lightwall stainless steel piping systems where future changes makes welding undesirable.

Pipe is expanded directly into insert flange to make leak-proof connections. A serrated insert holds the pipe to eliminate rotation of the pipe in the joint. Flange is held to the insert by a lip that allows the flange to be pulled up tightly against Neoprene or Teflon gaskets.

More information? Circle Item 57, postcard, last page.

Start Anti-Corrosion Service

A group of experienced painting contractors, paint chemists, and application technicians has organized Corrosion Protection Services Co., Inc., New York, N. Y. The prime purpose of the organization is to provide qualified personnel experienced in the technical aspects of the application of the heavy duty coatings so frequently mishandled by inexperienced contractors. The problems of surface preparation, whether it be wire brushing, steam cleaning, sandblasting or pickling, will be handled as well as the application of the coating. The company also provides experienced personnel to make recommendations for the solution of any corrosion problem in the coating field.

This idea of adding "know-how" to paint contracting has been well received by engineers and architects, the company states. In the first few months of the company's organization, contracts are said to have been awarded for coating everything from bridges and chemical plants and cooling towers to chemical tanks and sewage works.

More information? Circle Item 58, postcard, last page.

(Continued on page 132)

...and uses

THERMAL

AIR CONDITIONERS

In the recently completed Hermann Professional Building Addition* in the famous Texas Medical Center, Houston, seven big Thermal central plant air units provide conditioning of primary ventilation air and furnish year around air conditioning comfort for the interior zones of the structure. Other Thermal equipment is also in use in the original building constructed several years ago.

Thermal Engineering manufactures a complete line of central plant and multizone conditioners, sprayed coil units, heating and ventilating units, heating and cooling coils and air-cooled condensers. Write for catalog and list of other outstanding buildings using Thermal equipment. Thermal products can be specified with the confidence they will give years of satisfaction.

*Left half of illustration
Consulting Engineer:
Bernard Johnson and Assocs.

Agents in principal cities.

Quality Products Since 1945.

THERMAL ENGINEERING CORPORATION

2605 W. DALLAS • P. O. BOX 19754
HOUSTON 19, TEXAS

(Continued from page 130)

Self-Propelled Trencher

A self-propelled light trenching machine, Model C Ditch Witch, is announced by the manufacturer, The Charles Machine Works, Inc., Perry, Okla. The model is powered by a 7-hp air-cooled gasoline engine, and will dig trenches 3, 4½, or 6-inches wide at depths up

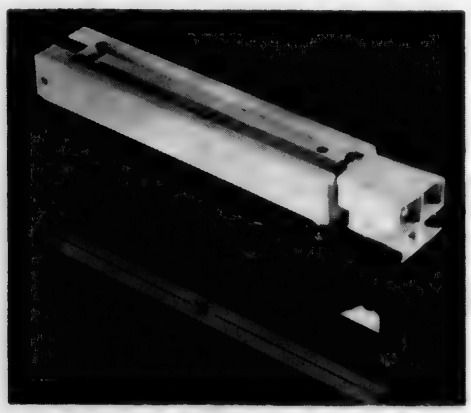
to 2 ft. Trenching speed is about 4 fpm.

Completely mobile under its own power, the 34-inch wide trencher is easily handled on the job by one man. Obvious applications of machine are seen in lawn sprinkler systems, gas services, and water lines.

More information? Circle Item 59, postcard, last page.

Portable Psychrometer

A compact, motor-driven portable psychrometer for determining relative humidity is developed by Friez Instrument Div., Bendix Aviation Corp., Baltimore, Md. The self-contained precision instrument, named the Psychron, was designed to rigid government specifications for use by the U. S. Weather Bureau. In addition



to its meteorological application, the commercial model will be useful in many other fields where temperature and humidity must be closely checked or controlled—such as in air conditioning, refrigeration, and heating.

Powered by three flashlight batteries, unit consists of a matched wet- and dry-bulb thermometer assembly ventilated by a tiny fan coupled to a motor. The thermometers attain an accuracy of ± 0.3 deg F at any point.

Its advantages over the widely used sling-type psychrometer are said to be easier and safer close-quarter operation and more precise aspiration rate. It also is immune from radiation effects of the sun, and has a built-in thermometer illumination system for easy reading in the dark, the company states.

The Psychron operates in a relative humidity range of from 10 to 100%, and a temperature range of from 10 to 100 deg F. The complete commercial unit will be available this fall and will sell at about eighty dollars.

More information? Circle Item 60, postcard, last page.

Compact Solenoid Valve

Development of a new solenoid valve, Model 291, is announced by Controls Company of America, Milwaukee, Wis.

Available in brass or stainless steel, the 2-way valve can be used for air, gas, water, oil and all common in-

dustrial fluids, and was designed for use in tight equipment corners or wherever a compact normally closed valve is needed to control flow. Mounted in any position, the general purpose valve provides long lasting performance, the company states.

Dimensions, valve specifications, recommended applications and charts on the different models are given in Form No. E-232, available from the company.

More information? Circle Item 61, postcard, last page.

Ductile Iron Steam Traps

A line of ductile iron steam traps, at less than half the cost of comparable cast steel traps, is announced by Strong Steam Specialties Division of Strong, Carlisle & Hammond, Cleveland, Ohio. Known as Series 540 Hydro-Flex traps, this line is designed for service to 500 psi and 650 deg F.

Inverted bucket design of the traps incorporates a dual-fulcrum action of the valve lever which provides high discharge flow when required, yet permits efficient handling of very low condensate loads. All internal parts are made of heavy stainless steel to withstand the most severe operating conditions. The bucket is deep-drawn with no seams or joints.

Traps are available in five standard sizes with pipe connection from ½ to 2 inches (screwed or socket weld), and discharge capacities to 42,800 lb water per hr.

More information? Circle Item 62, postcard, last page.

(Concluded on page 134)

KRAMER

UNICON for UNLIMITED TONNAGE

Kramer Unicon has brought a new era into the industry. With more than 20 years of unique practical experience and know-how in dry condensing, Kramer again offers new avenues of opportunity to the air conditioning and refrigeration industry.

Unicon now has no capacity limit. Standard Unicon systems up to 540 tons are now cataloged for the first time.

Unicons for heat pump applications are now also available with no horsepower limitations.

Kramer engineering and design has proven that the Unicon can move large volumes of air with extreme quietness.

Unicon has long proven by actual experience that it is free from fouling or corrosion and requires practically no maintenance.

The total operating weight per ton for Unicon is very low, resulting in minimum platform and reinforcement requirements.

Unicon space requirements are surprisingly small; a 300 ton system requires only 15' x 14' floor space and is 12' high.

WRITE FOR BULLETIN U-391

KRAMER TRENTON CO. • Trenton 5, N.J.

44 YEARS OF CONTINUOUS ACHIEVEMENT IN HEAT TRANSFER

(Concluded from page 132)

Conversion Kits for Liquid Meters

New crank-control conversion kits for the company's old-model Rotocycle positive-displacement liquid meters are introduced by Meter and Valve Div., Rockwell Manufacturing Co., Pittsburgh, Pa. The kits, consisting of a complete crank-controlled rotor measuring assembly, are

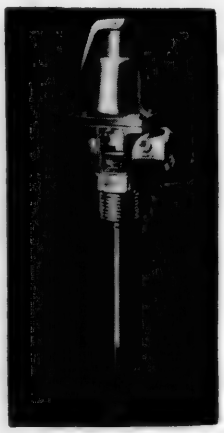
designed for easy installation in all No. 4, 5, and 6 gear-controlled models now in the field.

Advantages claimed for the new linkage-controlled assembly include 20% greater measurement capacity; greater life expectancy; quiet operation; permanent timing (eliminating retiming effort and cost); and fewer moving parts (reducing maintenance costs).

More information? Circle Item 63, postcard, last page.

All-Bronze Relief Valves

Two ASME-rated self-closing temperature and pressure relief valves, known as No. 40L and No. 40XL, having ¾-inch male inlet and female outlet connections, are announced by Watts Regulator Co., Lawrence, Mass.



No. 40L is equipped with level and short thermostat. No. 40XL has lever and extension thermostat. Of all-bronze construction, these valves, said to be moderately priced, have steam pressure discharge ratings of 810,000 Btu per hr at 125 psi and AGA temperature water rating of 500,000 Btu per hr.

The new series complements the company's Series 140-240 to ofier a complete range of sizes, connection styles, and ratings.

More information? Circle Item 64, postcard, last page.

Nylon Compression Fittings

Manufactured by Nylo.. Molding Corp., Garwood, N.J., is a nylon compression fitting under the trade name Presslok. The fittings are designed to provide an anti-corrosive, positive anchor, for original or replacement application, in hydraulic or pneumatic installations using brass, copper, aluminum, steel, or nylon tubing without distorting or damaging the tubing. Fittings are available in 7 sizes from ⅛ to ½-inch OD.

Company asserts test-proven fittings withstand pressures to 1200 psi and temperatures ranging from 40 to 300 deg F. Easy installation, with no reaming, tapping, flaring, or wrench turning required, results in savings in time and labor, claimed by the company to be as much as 75% in comparison with other types of fittings.

More information? Circle Item 65, postcard, last page.

Synthetic Fiber Filter

Air filters, consisting of disposable filter pads and cadmium-plated metal holding frames, are available from Arco Mfg. Corp., New York, N. Y. Called Pure-Air filters, they are completely free of any oil or adhesive.

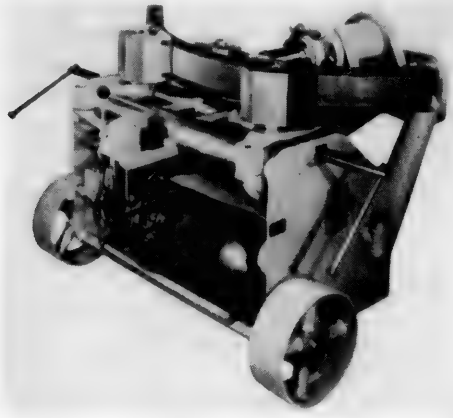
Offered in various efficiencies, pads are said to be easy to change. One pulls out the retainer ring, removes the dirty filter pad, installs a clean filter pad, and replaces the retainer ring.

According to the company's announcement, these pads are more efficient than conventional viscous coated filters, cost less than glass fiber filters, and weigh only about one ounce each.

More information? Circle Item 66, postcard, last page.

Portable Bending Machine

A bending machine that can be moved to the job, and after construction work is completed can be left in the plant for inter-shop operations, is offered by Wallace Supplies Mfg. Co., Chicago, Ill. No. 420 portable hy-

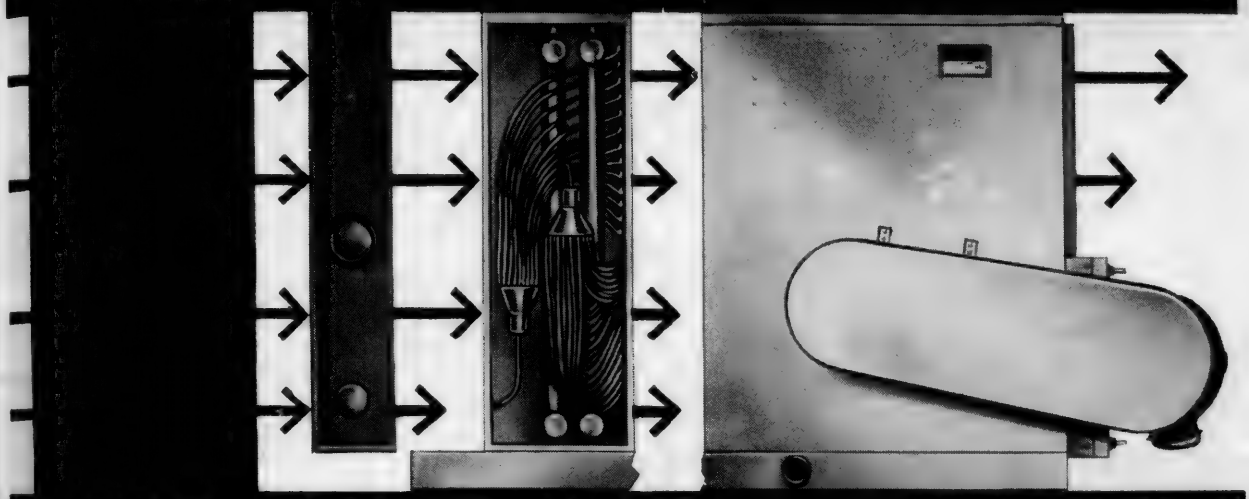


draulic ram bender will handle up to 6-inch pipes, I-beams, channels, angles, or similar structural shapes.

Hydraulic ram action is easily controlled by the operator. A single valve brings the cylinder in and out of bending position. Machine is all welded construction; its net weight with standard dies, 9,700 lb.

More information? Circle Item 67, postcard, last page.

NOW YOU CAN HAVE ELECTRONIC AIR CLEANING WHEREVER AIR DISTRIBUTING UNITS ARE USED



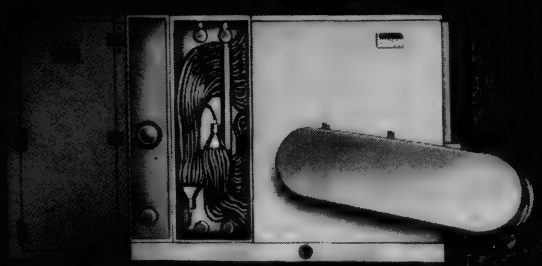
Westinghouse Electronic Air Cleaner Sections for "In-Line" Assembly . . . 25½" in direction of air flow . . . no additional access space required!

PRECIPITRON . . . the original Electronic Air Cleaner, provides top-notch cleaning efficiency in Westinghouse Air Distributing Units!

Here's proof: U. S. Bureau of Standards Blackness Test . . . Ordinary mechanical filters . . . 5-15% efficiency

Westinghouse PRECIPITRON . . . 85-97% efficiency

Don't just *FILTER* your air when you can *CLEAN* it . . . inexpensively!



Precipitron Air Cleaning Section Combined With Air Distributing Units for Application at Normal Cooling Coil Face Velocities . . . Up to 28,000 CFM, Up to 150 Tons.

Westinghouse manufactured fans, motors, heating and cooling coils and Electronic Air Cleaning sections are matched together to meet your requirements for heating, ventilating, air conditioning and air cleaning . . . all with a single equipment warranty . . . a Westinghouse exclusive!

Case studies prove that in commercial installations Westinghouse PRECIPITRON pays for itself in less than one year through savings in cleaning and maintenance costs.

One Unit, One Supplier, One Price! Westinghouse now offers you the complete air handling package — Electronic Air Cleaner, heating coil, cooling coil and fan section — ready for your electrical, piping and duct connections.

More Information?

Call your nearest Sturtevant Division Sales Engineer, or write Westinghouse Electric Corporation, Dept. B-6, Hyde Park, Boston 36, Massachusetts.

J-80656

YOU CAN BE SURE...IF IT'S Westinghouse

PRODUCT APPLICATIONS

New, Unusual, or Ingenious Uses of Equipment and Materials

Steel Fins Slipped onto Welded Tubing Halves Coil Weight

Pictured is a beef boning room of a large Mid-western packing plant with overhead cooling coil fabricated of steel fins and welded carbon steel tubing. Saving in weight over bare-pipe coils is estimated at one half or more.

The 7½-inch square fins of 16-gage steel, are slipped onto 2⅜-inch OD by 0.148-inch carbon steel tubing. The

latter's uniform concentricity facilitates assembly. After the fin plates have been accurately spaced, and while still held in place only by friction, the welded steel tubing is expanded slightly to form an effective mechanical friction bond between the fin and the tube. This bond, after expanding, is made uniform largely because of the concentricity of the tube, states the fin-coil manufacturer, The Vilter Mfg. Co., Milwaukee, Wis. Following this process, the entire assembly is hot-dipped galvanized which fills in around the circumferential recess in the heel of the fin plate fillets, firmly securing the bond between fin and tube. Tube ends are then prepared for welding, threading, or flanging.

PVC System Keeps Water Clear For Unique Indoor Waterfall

Piping system for a unique waterfall in a new office building at 666 Fifth Ave., New York City, had to be noncorroding to avoid discoloration of the water. Possible use of a freezing inhibitor in the water also required a highly corrosion resistant piping material. The plumbing contractor, John Weil Plumbing Corp., together with the owner and consulting engineers chose rigid polyvinyl chloride as the material for the system, including the valves and fittings.

The waterfall, located in the arcade and lobby of the 38-story building built by Tishman Realty & Construction Co., is 16-ft high and 40-ft long. The flow of water is constant with about 250 gpm cascading down black corrugated glass into the pool below. A centrifugal pump keeps the water flowing through the system from two 600-gal steel receiving tanks which are cement lined to prevent contact of water with the metal.

Use of anti-freeze in the all-year-round waterfall is a possibility, but for the present the water is heated and maintained at an above-freezing temperature. A freezing inhibitor that was considered is ethylene glycol, to which PVC has excellent resistance. The water is being treated to prevent formation of algae. As with the freezing inhibitor, the PVC is also inert to the anti-algae agent.

Walworth Company, New York, N. Y. supplied the polyvinyl chloride solvent-weld, socket-type valves and fittings for use with PVC pipe manufactured by Alpha Plastics Inc., Livingston, N. J.

Electronic Air Cleaner in Exchange Protects Investment, Aids Service

Electronic air cleaning is reported to have successfully solved a problem for one of the country's fastest growing independent telephone companies. By 1955, the North Pittsburgh Telephone Company had assembled almost one million dollars worth of intricate electrical equipment in its Gibsonia, Pa., headquarters building.

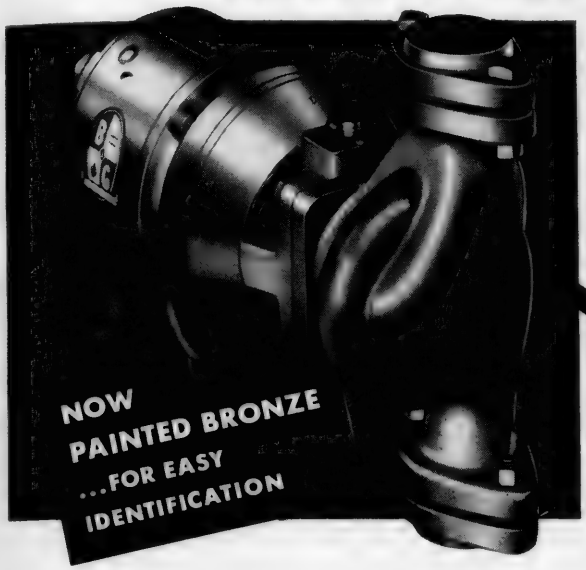
Management could then have taken the stand that no additional investment in central office equipment should be made at that time. But, experienced operating personnel pointed out that by increasing the investment 2/10 of 1%, positive protection was assured against certain types of "poor service" complaints. This small investment would provide electronic air cleaning in the automatic equipment area. Impurities in the atmosphere would be removed before they could damage electrical equipment or cause interference in telephone service.

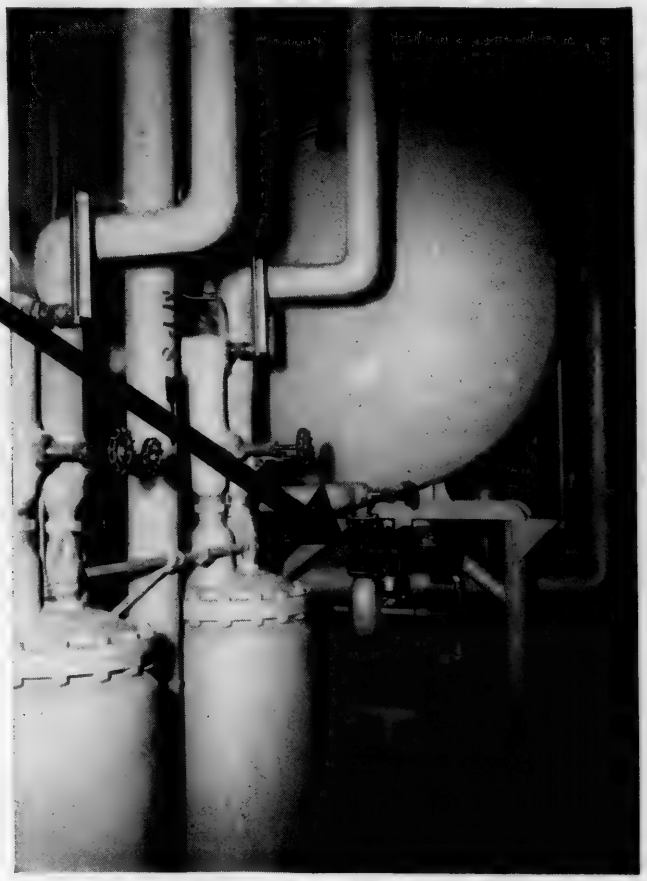
As a result, about $2,500 was spent to install an Electro-air electronic air cleaner adjacent to the summer-winter air conditioning unit. Ducts connected the Model C-205 air cleaner with the return air opening of a Model 1015 Chrysler Airtemp unit. Thus all air passing through the air conditioner had to first travel through the electrostatic field of the air cleaner.

In the two years since installation, electronic air cleaning definitely has prevented equipment failures due to dust, lint, dirt, and pollen in the automatic equipment area.

B&G ALL-BRONZE BOOSTERS

FOR LONG LIFE IN CIRCULATING HOT OR COLD RAW SERVICE WATER FOR FAUCET OR INDUSTRIAL USES



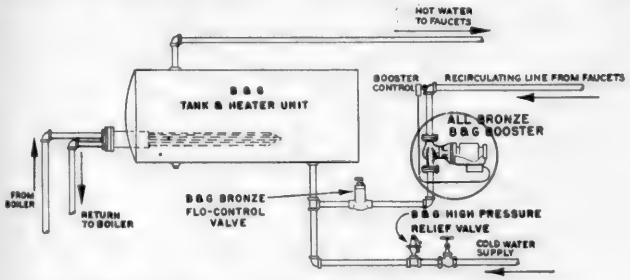


Where hot or cold service water is to be pumped, the use of an all-bronze pump is imperative. Otherwise, the corrosive effects of continuously pumping fresh water materially shortens pump life.

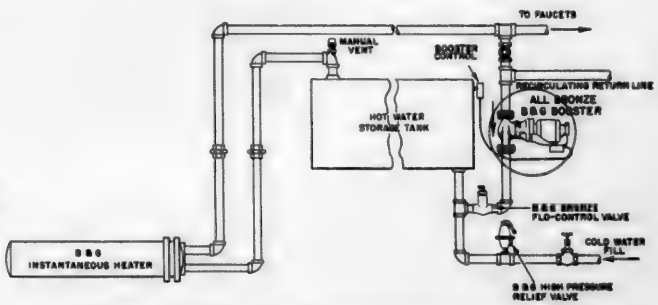
The B&G All-Bronze Booster is specifically built for service water pumping applications. In such systems, the Booster can be installed in numerous ways to step-up efficiency, increase hot water production and reduce heating costs. It is immune to corrosion, hence will give years of dependable service.

For *quiet* operation, failure-proof performance and long life, the B&G Booster is the *preferred* pump.

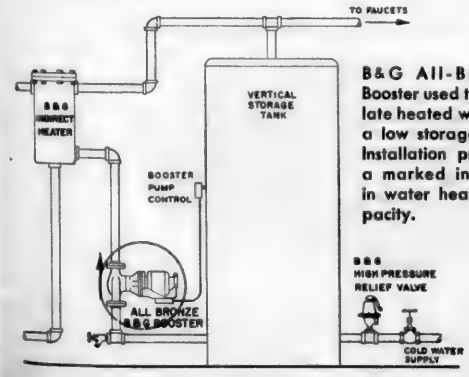
Installation of B&G All-Bronze Booster in Chrysler automatic transmission plant at Kokomo, Indiana. This small unit handles the circulating requirements of the service water heating system.


HOT WATER TO FAUCETS
B & G TANK & HEATER UNIT
BOOSTER CONTROL
RECIRCULATING LINE FROM FAUCETS
ALL BRONZE B&G BOOSTER
FROM BOILER
RETURN TO BOILER
B&G BRONZE FLO-CONTROL VALVE
B & G HIGH PRESSURE RELIEF VALVE
COLD WATER SUPPLY

B&G All-Bronze Booster used on recirculating line from hot water faucets maintains hot water at fixtures at all times. Recommended on all installations, particularly where long plumbing lines are used.



All-Bronze B&G Booster used to provide an extra supply of hot water from an undersized boiler. Semi-tankless hook-up maintains initial supply of hot water.



B&G All-Bronze Booster used to circulate heated water to a low storage tank. Installation provides a marked increase in water heater capacity.

Send for Bulletin No. IA-856

BELL & GOSSETT COMPANY

Dept. FD-4, Morton Grove, Illinois

Canadian Licensee: S. A. Armstrong Ltd., 1400 O'Connor Drive, Toronto 16, Ontario

DEGREE-DAYS FOR DECEMBER, 1957

(A) Airport readings; (C) City office readings; (O) Readings at a point on outskirts of city

AIR CONDITIONING, HEATING AND VENTILATING'S 30th Year of Publication of Monthly Degree-Day Data

City	December			Season to Dec. 31, incl., from Sept. 1		
	1957	1956	Normal	1957	1956	Normal
Abilene, Texas (A)	466	489	595	1100	911	1098
Albany, New York (A)	981	1066	1197	2274	2541	2559
Albuquerque, New Mexico (A)	817	880	899	1829	1790	1757
Alpena, Michigan (C)	1120	1153	1218	2745	2786	2827
Asheville, North Carolina (C)	731	481	769	1698	1346	1633
Atlanta, Georgia (A)	560	324	614	1138	814	1125
Atlantic City, New Jersey (C)	699	605	831	1424	1385	1597
Augusta, Georgia (A)	528	300	494	999	722	835
Baltimore, Maryland (C)	708	567	812	1393	1224	1537
Billings, Montana (A)	856	1050	1172	2583	2435	2739
Binghamton, New York (C)	936	923	1113	2230	2224	2417
Birmingham, Alabama (A)	520	322	596	1105	822	1128
Bismarck, North Dakota (A)	1257	1369	1535	3138	3173	3458
Block Island, Rhode Island (A)	714	772	927	1588	1774	1936
Boise, Idaho (A)	940	1059	1054	2325	2490	2340
Boston, Massachusetts (A)	766	893	998	1669	1957	2008
Buffalo, New York (A)	930	947	1116	2243	2143	2424
Burlington, Iowa (A)	970	1070	1150	2257	2039	2334
Burlington, Vermont (A)	1092	1196	1308	2528	2781	2859
Cairo, Illinois (C)	628	608	784	1362	1170	1465
Charleston, South Carolina (C)	404	194	410	676	460	658
Charlotte, North Carolina (A)	611	365	682	1238	947	1274
Chattanooga, Tennessee (A)	657	416	710	1374	1041	1380
Cheyenne, Wyoming (A)	923	994	1125	2809	2564	2840
Chicago, Illinois (C)[b]	941	927	1147	2163	1822	2352
Cincinnati, Ohio (C)	723	604	880	1588	1303	1711
Cleveland, Ohio (A)	891	828	1057	2047	1850	2171
Columbia, Missouri (A)	797	693	989	1852	1440	1967
Columbia, South Carolina (A)	526	283	524	993	723	908
Columbus, Ohio (C)	846	732	983	1917	1613	1995
Concord, New Hampshire (A)	990	1170	1271	2353	2824	2839
Concordia, Kansas (C)	812	879	1029	1975	1748	2048
Dallas, Texas (A)	363	433	518	861	802	870
Dayton, Ohio (A)	882	790	1032	2058	1764	2122
Denver, Colorado (A)	782	901	1032	2181	2075	2348
Des Moines, Iowa (A)	1018	1111	1203	2457	2183	2455
Detroit, Michigan (A)	952	929	1101	2227	2057	2325
Devils Lake, North Dakota (C)	1428	1574	1668	3557	3609	3795
Dodge City, Kansas (A)	748	869	980	1896	1701	1951
Dubuque, Iowa (A)	1111	1207	1290	2712	2508	2765
Duluth, Minnesota (C)	1465	1518	1550	3585	3523	3533
Elkins, West Virginia (A)	897	700	995	2243	1942	2255
El Paso, Texas (A)	570	624	626	1173	1183	1086
Ely, Nevada (A)	1058	1117	1181	3041	2938	2864
Escanaba, Michigan (C)	1227	1275	1321	2980	2935	3056
Evansville, Indiana (A)	727	688	871	1703	1487	1715
Fargo, North Dakota	1343	1494	1615	3259	3215	3538
Fort Smith, Arkansas (A)	559	599	698	1218	1140	1273
Fort Wayne, Indiana (A)	942	935	1122	2303	2037	2365
Fort Worth, Texas (A)	410	468	533	956	863	890
Fresno, California (A)	604	627	580	1069	1109	1011
Galveston, Texas (C)	175	154	271	369	301	402
Grand Junction, Colorado (A)	1032	1235	1132	2281	2438	2293
Grand Rapids, Michigan (A)	1039	1018	1169	2538	2259	2597
Green Bay, Wisconsin (A)	1232	1310	1392	2993	2912	3035
Greensboro, North Carolina (A)	693	493	772	1517	1291	1513
Greenville, South Carolina (A)	613	372	648	1258	986	1200
Harrisburg, Pennsylvania (A)	855	762	964	1900	1834	1971
Hartford, Connecticut (A)	876	926	1082	2019	2359	2266
Hatteras, North Carolina (C)	(a)	259	481	(a)	532	788
Havre, Montana (C)	960	1218	1383	2842	2851	3240
Helena, Montana (A)	998	1145	1311	2976	2836	3247
Houston, Texas (C)	205	189	303	451	363	465
Huron, South Dakota (A)	1118	1230	1407	2760	2731	3003
Indianapolis, Indiana (A)	888	808	1051	2114	1766	2141
Jackson, Mississippi (A)	449	298	503	916	705	882
Kansas City, Missouri (A)	783	866	970	1765	1568	1875
Knoxville, Tennessee (A)	648	415	744	1363	1045	1454
La Crosse, Wisconsin (A)	1189	1247	1380	2793	2586	2900
Lander, Wyoming (A)	1111	1204	1383	3152	2889	3309
Lewiston, Maine (O)	1051	1180	1295	2477	2812	2837

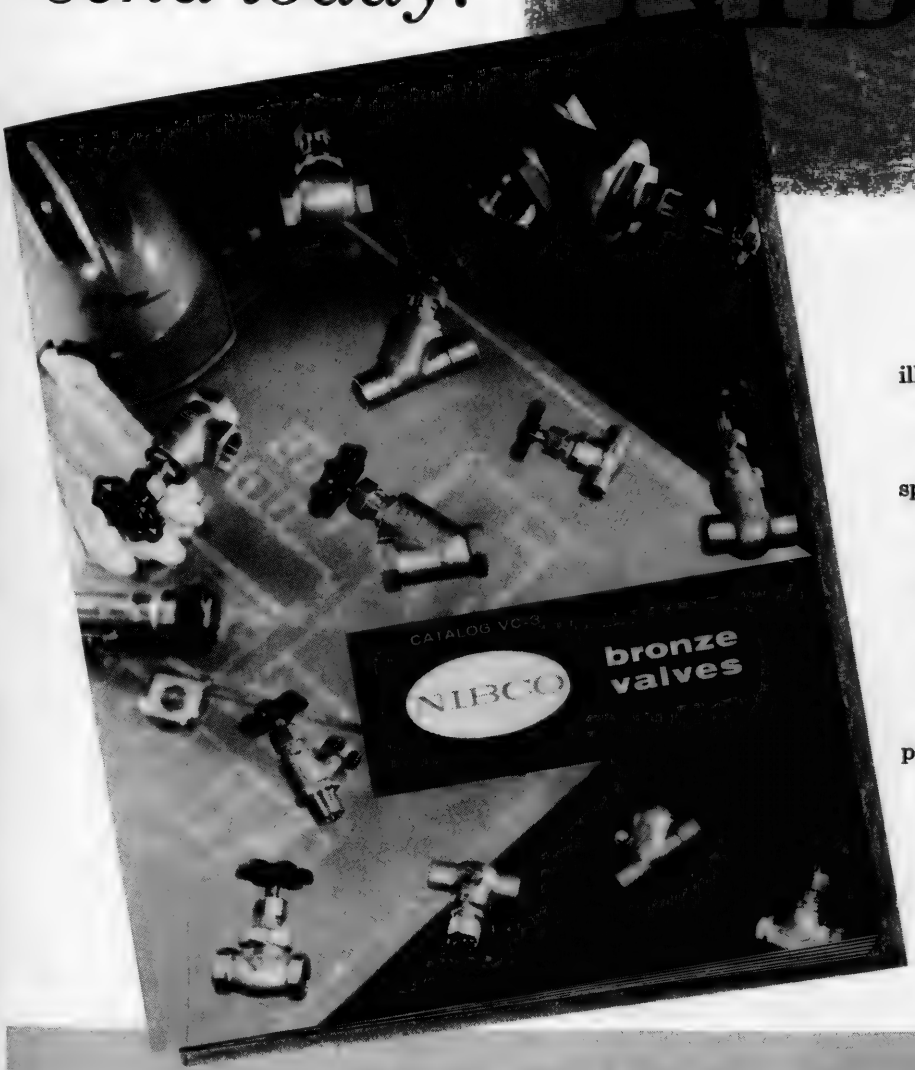
(a) Data not available. [b] 1957 and normal figures are for Midway Airport; 1956 figures are for Grant Park Station.

Normal figures in this table are based on 30-year period covering 1921 to 1950, inclusive, as compiled and published by the U. S. Weather Bureau.

Figures in this table, with two exceptions, based on local weather bureau reports. Exceptions are Utica and Lewiston, figures for which are furnished through the courtesy of Coke Sales Department, Central New York Power Corp., Utica, N. Y., and Norman E. Ross, Bursar, Bates College, Lewiston, Me., respectively. [Table concluded on page 140]

Free from NIBCO

send today!



This free catalog for 1958 illustrates and gives complete specifications of NIBCO low pressure, pressure rated and special type bronze valves . . . including the sensational new Y-Pattern Globe and Check Valves. These are the valves that give you more shut-offs per dollar . . . fully guaranteed to operate perfectly. See your wholesaler or send coupon below.

VALVE CATALOG VC-3

NIBCO INC. — Dept. H- 8302 Elkhart, Indiana
Please rush free copy of your new Valve Catalog No. VC-3.

Name_____

Firm_____

Address_____

City, State_____

☐ Also send address of nearest source of supply.

Degree-Days for December, 1957 (Concluded)

(A) Airport readings; (C) City office readings; (O) Readings at a point on outskirts of city

AIR CONDITIONING, HEATING AND VENTILATING'S 30th Year of Publication of Monthly Degree-Day Data

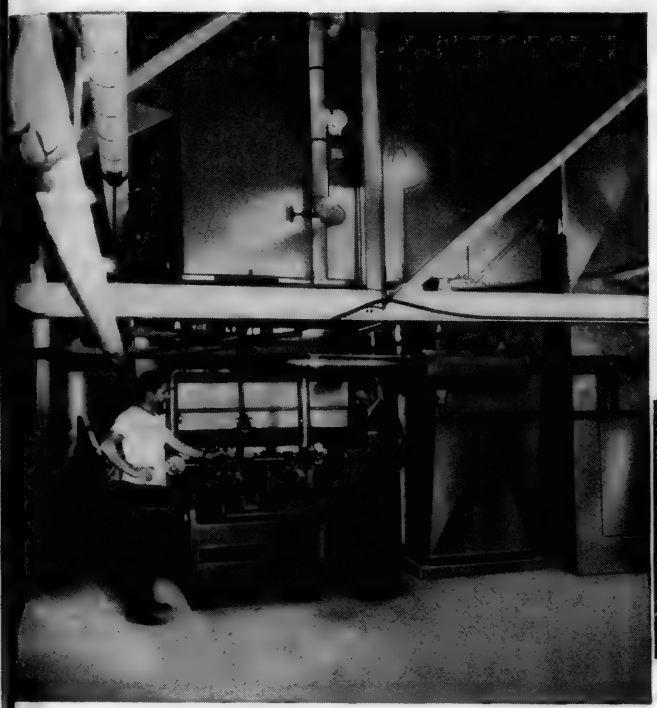
City	December			Season to Dec. 31, incl., from Sept. 1		
	1957	1956	Normal	1957	1956	Normal
Lincoln, Nebraska (C)	863	938	1113	2141	1855	2243
Little Rock, Arkansas (A)	487	492	654	1029	958	1179
Los Angeles, California (C)	112	135	253	259	211	451
Louisville, Kentucky (A)	712	624	871	1627	1442	1733
Lynchburg, Virginia (A)	728	527	809	1646	1410	1625
Macon, Georgia (A)	460	274	481	856	650	824
Madison, Wisconsin (A)	1142	1216	1287	2757	2504	2707
Marquette, Michigan (C)	1218	1255	1299	2926	2900	3011
Memphis, Tennessee (A)	526	482	673	1130	969	1248
Meridian, Mississippi (A)	464	290	528	923	724	956
Milwaukee, Wisconsin (A)	1087	1139	1218	2631	2454	2611
Minneapolis, Minnesota (A)	1226	1267	1414	2873	2660	2990
Moline, Illinois	989	1108	1181	2392	2196	2426
Montgomery, Alabama (A)	470	273	491	854	672	864
Nashville, Tennessee (A)	619	450	725	1387	1045	1372
New Haven, Connecticut (A)	842	872	1026	1855	2039	2145
New Orleans, Louisiana (C)	232	123	382	436	309	429
New York, New York (C)	749	732	908	1528	1595	1771
Newark, New Jersey	796	767	961	1634	1693	1912
Norfolk, Virginia (A)	558	390	688	1110	902	1257
North Platte, Nebraska (A)	968	1040	1172	2435	2355	2563
Oak Ridge, Tennessee	673	427	812	1371	1099	1587
Oakland, California (A)	496	547	508	938	1120	1077
Oklahoma City, Oklahoma (A)	631	713	747	1483	1316	1367
Omaha, Nebraska (A)	921	1004	1166	2244	1995	2368
Parkersburg, West Virginia (C)	798	643	896	1810	1508	1824
Peoria, Illinois (A)	949	1026	1128	2185	1976	2312
Philadelphia, Pennsylvania (C)	733	664	856	1487	1405	1624
Phoenix, Arizona (A)	303	356	360	568	617	555
Pittsburgh, Pennsylvania (C)	808	683	924	1834	1588	1890
Pittsfield, Massachusetts	1010	1083	1246	2522	2725	2845
Pocatello, Idaho (A)	1050	1163	1184	2786	2870	2727
Portland, Maine (A)	986	1156	1237	2359	2788	2776
Portland, Oregon (C)	619	711	701	1471	1690	1600
Providence, Rhode Island (A)	817	885	1035	1854	2103	2195
Pueblo, Colorado (A)	798	916	1051	2025	2022	2279
Raleigh, North Carolina (A)	619	428	651	1349	1104	1166
Rapid City, South Dakota (A)	924	1083	1218	2542	2521	2802
Reading, Pennsylvania (C)	809	741	936	1745	1715	1866
Red Bluff, California (A)	916	1063	986	2433	1063	2338
Reno, Nevada (A)	674	493	791	1475	1233	1532
Richmond, Virginia (A)	948	993	1141	2304	2289	2473
Rochester, New York (A)	655	715	750	1488	1425	1415
Roswell, New Mexico (A)	578	581	567	1044	998	980
Sacramento, California (C)	888	965	927	2057	1819	1809
St. Joseph, Missouri (A)	702	769	893	1607	1424	1703
St. Louis, Missouri (C)	971	1077	1039	2382	2449	2279
Salt Lake City, Utah (A)	292	271	374	633	504	600
San Antonio, Texas (A)	117	156	255	251	268	478
San Diego, California (A)	886	844	1039	2070	1842	2116
Sandusky, Ohio (C)	413	372	406	789	804	881
San Francisco, California (C)	1271	1390	1398	3076	3256	3340
Sault Ste. Marie, Michigan (A)	442	232	413	761	562	675
Savannah, Georgia (A)	966	943	1057	2269	2314	2254
Scranton, Pennsylvania (A)	581	669	679	1505	1762	1682
Seattle, Washington (C)	921	1073	1271	2781	2630	3045
Sheridan, Wyoming (A)	384	344	490	809	701	848
Shreveport, Louisiana (A)	1003	1151	1290	2464	2300	2708
Sioux City, Iowa (A)	923	1055	1113	2518	2739	2705
Spokane, Washington (A)	874	937	1017	2059	1824	1998
Springfield, Illinois (A)	693	784	908	1686	1519	1833
Springfield, Missouri (A)	949	979	1113	2222	2287	2340
Syracuse, New York (A)	944	923	1119	2301	2114	2364
Toledo, Ohio (A)	786	879	977	1823	1623	1891
Topeka, Kansas (C)	794	728	930	1658	1656	1852
Trenton, New Jersey (C)	582	689	750	1327	1239	1382
Tulsa, Oklahoma	1044	1413	1144	2350	2851	2537
Utica, New York (O)	993	1051	1212	2592	2498	2709
Valentine, Nebraska (A)	696	820	890	1857	2049	1966
Walla Walla, Washington (C)	720	594	831	1532	1351	1604
Washington, D. C. (C)	757	856	915	1802	1577	1763
Wichita, Kansas (A)	1216	1401	1528	3134	3183	3495
Williston, North Dakota (C)	983	1138	1085	2697	2769	2595
Winnemucca, Nevada (A)	914	1044	1066	2362	2576	2469
Yakima, Washington (A)						

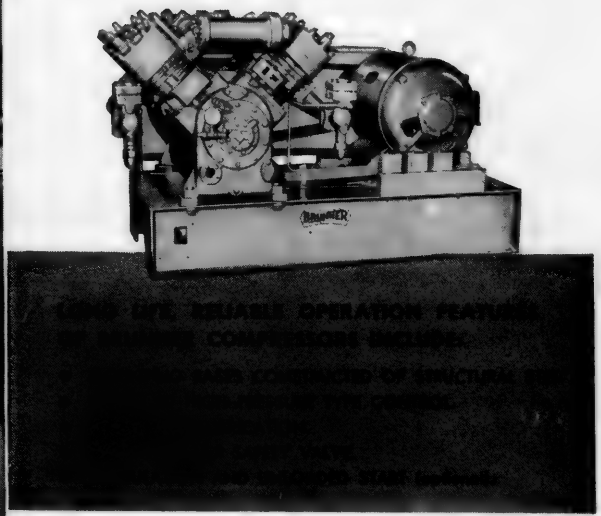
For footnotes, see page 138.

FOR THOSE BIG AIR CONDITIONING JOBS...

Compressors from the BIG BRUNNER LINE

BRUNNER SINCE 1906





Typical of the BIG air conditioning jobs where architects, consulting engineers and contractors have learned to rely on BRUNNER compressors is the new Bostitch plant in East Greenwich, Rhode Island.

75 HP compressors, 100 HP compressors—whatever the size requirement—there was a Brunner unit to satisfy the design conditions.

Rugged workhorses of the various air conditioning systems at Bostitch, these units are tied-in to Dunham-Bush evaporative condensers and serve ceiling mounted air handling units for the Stapling, Engineering and Drafting departments. They also serve Dunham-Bush multizone units for conditioning executive offices and cafeteria areas.

Select Dunham-Bush and Brunner for *single source service and responsibility.*

BRUNNER DIVISION
DUNHAM-BUSH, INC.
UTICA, NEW YORK

DUNHAM-BUSH

AIR CONDITIONING • REFRIGERATION • HEATING • HEAT TRANSFER
WEST HARTFORD, CONNECTICUT • MICHIGAN CITY, INDIANA • MARSHALLTOWN, IOWA
RIVERSIDE, CALIFORNIA • BRUNNER DIVISION, UTICA, NEW YORK
SUBSIDIARIES
heat-x HEAT-X, INC. BREWSTER, N.Y. · BRUNNER THE BRUNNER CO. GAINESVILLE, GA. · DUNHAM-BUSH (CANADA), LTD. TORONTO, CANADA
DUNHAM-BUSH, LTD. LONDON, ENGLAND · BRUNNER BRUNNER CORPORATION (CANADA) LTD. PORT HOPE, ONTARIO

NEWS OF THE MONTH

EIGHT FELLOWS

named by American Society of Heating and Air Conditioning Engineers at 64th annual meeting.

The American Society of Heating and Air-Conditioning Engineers at a recent meeting of the Council of the Society conferred the honor of Fellow of the Society on eight outstanding members prominent in the heating, ventilating and air conditioning profession.

Those honored are Albert L. Baum, Jaros, Baum & Bolles; the late Alfred C. Buensod, Buensod-Stacey, Inc.; Professor Carl F. Kayan, Columbia University, all of New York, N. Y.; Irwin W. Cotton, Indianapolis, Ind.; Edward L. Crosby, Henry Adams, Inc., Baltimore, Md.; Edmund P. Heckel, E. P. Heckel & Assoc., Chicago, Ill.; Professor Emeritus Frank B. Rowley, University of Minnesota, Minneapolis, Minn.; and George M. Simonson, San Francisco, Calif.

Presentation of the certificates of Fellow grade was made in Pittsburgh on January 27, 1958, at the Welcome Luncheon in the Penn-Sheraton Hotel on the opening day of the 64th annual meeting of the Society.

The grade of Fellow is honorary and may only be conferred on Society members of professional distinction who have reached the age of 45 and have been members in good standing for at least ten years. Prior to this year the Society has honored only five members with the grade of Fellow.

CORROSION ENGINEERS

to hear four talks on effects of air pollution on corrosion of metals at March meeting.

Two talks on the effects of air pollution on the corrosion of materials and two on the corrosion mechanisms of metals will be presented as educational lectures during the 14th Annual Conference and Exhibition of the National Association of Corrosion Engineers. These lectures, popular at previous NACE meetings, are expected to attract wide interest.

This feature of the technical program at the San Francisco conference, March 17-21, 1958, is in addition to 16 symposia on such subjects as aircraft corrosion, cathodic protection, coatings, marine exposures, plastic materials, pulp and paper industry, utility industry and others. In addition, four round table type sessions will be held on pipeline and underground corrosion, general corrosion problems, refinery industry and coordination of underground cathodic protection systems by utilities.

AIR POLLUTION COMMITTEE

of Engineers Joint Council issues policy statement. Cause and cure, and engineers' functions outlined.

The Engineers Joint Council, New York, N. Y., through its Air Pollution Committee, has issued a policy statement on air pollution and its control for consideration by those concerned with the subject.

• **PRINCIPLES**—Eleven principles are outlined:

"1. The common goal is to maintain a reasonable degree of purity of our air consistent with: *a.* the public health and welfare and public enjoyment thereof, *b.* the continued industrial development of our country, *c.* the protection of plant and animal life, *d.* the protection of physical property and other resources.

"2. Air pollution means the presence in the outdoor atmosphere of one or more contaminants . . . injurious to human, plant or animal life or to property, or which unreasonably interfere with the comfortable enjoyment of life and property.

"3. Although the atmosphere is a medium suitable for the disposal of waste products, true conservation requires that the public interest be protected against excessive and unsafe use of the atmosphere for this purpose.

"4. Effective criteria are required to serve two purposes, namely, enforcement and protection of the public interest. The first of these can be most effectively ac-

(Continued on page 144)

The Scouting world's first Science Explorers post, sponsored by Helipot Div., Beckman Instruments, Inc., has been established at Newport Beach, Calif. Officially chartered as Helipot Science Explorers Post 201, a few members and advisors are pictured following charter ceremonies in the new Beckman Helipot plant. In the engineering laboratory, from left to right, are Ross J. Taylor, Scout executive; Douglas MacLachlan, supervisor of equipment and facilities for the new post; Roy Slagle, Helipot engineer who serves as chairman of the post advisory committee; Stan Lewis of Newport Beach, the post's chief engineer; and Ron Keeler, supervisor of finances for the group. The Science Explorers have launched a variety of individual technical projects, ranging from construction of a small-scale cyclotron to solid state diffusion research.

GENERAL ELECTRIC TAKES A GIANT STEP

Simplifies Air Conditioning for Big Projects . . . with New G-E Factory-Assembled Central Station Units . . . Water-Cooled and Air-Cooled

New General Electric 30-Ton Unit. Note smooth lines—no outside fan motors, filters, controls or other protruding parts. This unit is up to 2000 lbs. lighter than competitive 30-ton units. Features two G-E hermetic compressors.

Installation after installation has proved convincingly that large projects can be air conditioned *more efficiently,* at *less cost* with General Electric Factory-Assembled Central Station Units—*now available in 20, 25 and 30-ton capacities.*

Efficiency and low cost are only the beginning. Planning is greatly simplified—minimum need for fittings and piping—no elaborate equipment rooms—more free floor space. Air-cooled units (up to full 20 tons) eliminate cooling towers, water lines. Hermetic compressors minimize service problems. Installation in existing buildings requires no major alteration to premises, no serious interruption to business—and you get all the advantages of real Zone-by-Zone air conditioning.

Why not prove to yourself that it makes more sense to use General Electric Factory-Assembled Central Station Units for the big jobs. For complete data and specifications on all General Electric Commercial and Industrial Air Conditioners, write to: Mr. E. R. Pierce, General Electric Co., Commercial and Industrial Air Conditioning Dept., 5 Lawrence St., Bloomfield, N. J.

Progress Is Our Most Important Product

GENERAL ELECTRIC

In Canada: Canadian General Electric Co., Ltd., Montreal

complished at the points of emission, the second at the points of use. . . .

"5. In the development of standards . . . due consideration must be given to local conditions, such as topography, meteorology, industrial development, and area planning.

"6. Emphasis should be placed upon education and voluntary cooperation by all persons and organizations who may contribute to air pollution or who are interested in its control. . . .

"7. Laws with appropriate penalties may be necessary, but their use should be reserved for cases where cooperation and voluntary action do not prevail.

"8. During an emergency, such as may develop under adverse meteorological conditions, short-time curtailment of community and industrial activities which contribute to pollution may be necessary. Although such an emergency condition is seldom encountered, it is essential that duly constituted governmental authority anticipate such a problem, and be prepared to act through a prearranged procedure.

"9. The objective of air pollution control legislation is to recognize the right to the use of the air and the responsibility to avoid its abuse. It is the duty of the engineer to contribute the knowledge of his profession in the preparation of legislation that will accomplish this objective.

"10. Air pollution and its control involve many scientific problems that have not yet been solved. Continued research in this field is vitally necessary. The engineering profession has the obligation of reaching the best engineering solutions to these problems.

"11. It is the responsibility of the engineering profession to participate vigorously in the field of air pollution control."

• **THE CAUSE AND THE CURE**—After a general review of the problem, in which it is emphasized that the problem has developed before basic research essential to an adequate understanding of the factors involved was possible, specific causes are discussed. A section is devoted to methods of control: dilution, abolition, and treatment.

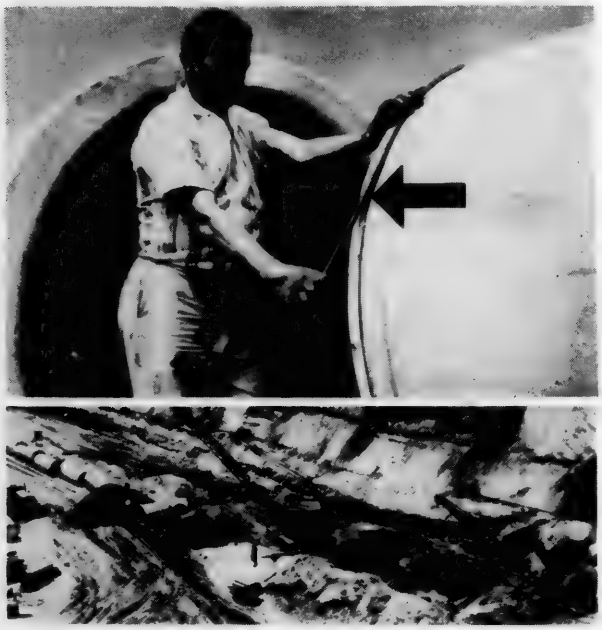
• **ENGINEERS' FUNCTIONS OUTLINED**— "Engineering involves directing the forces of nature and the activities of man to his own use, convenience and welfare. In view of air pollution's causes and effects, and the technical nature of its control, the engineering profession is qualified and is duty bound to contribute substantially to the control of air pollution.

Engineers are involved, through research, development, design, construction, installation, operation and maintenance, in activities that bring into being man-made sources of air pollution. Engineers have already made substantial contributions to the solution of air pollution problems by application of technical knowledge. Many of these contributions have resulted from efforts to utilize fuels and raw materials more effectively, while others have come from efforts specifically directed to minimizing air pollution nuisances and hazards.

Other professional disciplines are contributing to effective air pollution control in many fields; including agriculture, biology, government service, law, medicine, meteorology, politics, public health, science, and soil conservation.

The engineering profession is prepared to discharge its responsibilities in the physical control of air pollution by full participation with other professional disciplines, in establishing and effecting sound policies of control."

• **COMMITTEE**—The committee which prepared the statement was: S. G. Hess, ASCE; R. M. Mahoney, vice chairman, AIME; G. V. Williamson, L. A. Winkelman, ASME; R. J. Faust, AWWA; G. T. Minasian, AIEE; E. J. Kilcawley, ASEE; P. J. Marschall, ASHAE; C. A. Bishop, chairman, AIChE; F. D. Vermilya, SAME; F. S. Mallette, advisor; E. P. Lange, secretary; L. K. Wheelock, assistant secretary.



A new concrete sewer line is being installed between Venice and Playa del Rey, Calif. It will run just inshore from the ocean and will be 36 ft below sea level at one point to pass under projected harbor entrance channel. This 1700-ft section contains 118 lengths of 12-ft and 16-ft, 48-inch bell and spigot pressure pipe. Salt water seepage has to be constantly pumped out of excavation and will surround pipe. Picture on top shows application of Neoprene gasket specified to resist chemical action of sewage, seal line against 65-psi test pressure, and withstand external salt water exposure. Plans for line were prepared by Bureau of Engineering, City of Los Angeles, under the direction of Lyall A. Pardee, City Engineer.

LARGEST EXPORT ORDER

for room air conditioners placed by government of Kuwait, Arabia. Outdoor temperatures go to 123 degrees.

The sale of what purports to be the largest single order for room air conditioners ever placed by one export customer at one time has been announced by Air Conditioning Div., Remington Corp., Auburn, N. Y. The order was placed by the Electricity Department of the

(Continued on page 146)

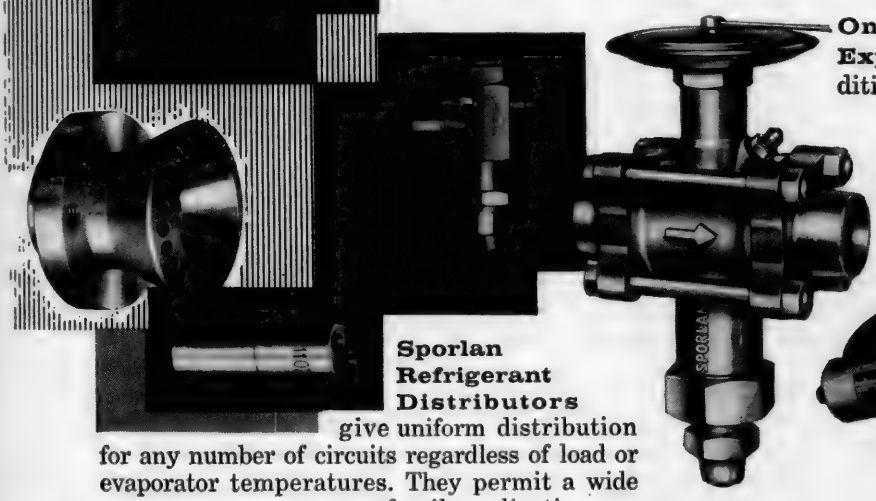
No Matter what the Size... Sporlan gives ANY Air Conditioning Installation PEAK PERFORMANCE Right Down the Line!

Systems from ¾ to 100 tons are kept perfectly dry with the famous **Sporlan Catch-All** filter-driers.

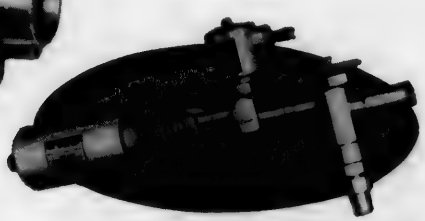
THE See-All

The amazing new **Sporlan See-All** shows you at a glance the degree of dryness and the amount of refrigerant the system is carrying.

Sporlan Solenoid Valves with the Power Packed Blue Seal Coil defy burn-outs.



Only Sporlan Thermostatic Expansion Valves for air conditioning offer the Flow Master element, which minimizes valve hunting... smooths out evaporator performance regardless of size.



Sporlan Refrigerant Distributors give uniform distribution for any number of circuits regardless of load or evaporator temperatures. They permit a wide range of coil applications... thanks to the Sporlan interchangeable nozzle!

Buy Sporlan Right Down the Line from your wholesaler for your next air conditioning installation, and no matter what the size of the job, Peak Performance Right Down the Line will be yours!

SPORLAN VALVE COMPANY

7525 SUSSEX AVENUE ST. LOUIS 17, MISSOURI

EXPORT DEPT. 85 BROAD STREET, NEW YORK 4, N. Y.

Government of Kuwait, Arabia. It is for 1500 room air conditioners especially designed for operation under the extreme climatic conditions existing in the Persian Gulf area.

The units in question all use special hermetic compressors nominally rated at 1¾ hp and having motors especially designed for operation on 50-cycle, 240-volt, single-phase current.

While the design standards established by Air Conditioning and Refrigeration Institute require room air conditioners to operate with an outside temperature as high as 115 deg F, the accompanying five-year tabulation of Government of Kuwait Weather Data shows why units that may satisfy ARI requirements are not adequate for service in this, one of the hottest spots on the face of the earth.

Year	1943	1944	1945	1946	1947
Recorded Maximum, deg F.	122	121	120	120	123
No. of Days at or above 120 deg F.	4	1	2	1	2
116	32	11	26	9	26
112	62	60	71	22	77
108	87	105	105	69	111
104	120	137	132	113	140
100	145	166	159	142	168

ANTHRACITE DATA

evokes optimistic comment from the industry despite downward trend shown in year-end report.

The Bureau of Mines reported that Pennsylvania anthracite production in 1957 resumed its post World War II downward trend, following a rise in 1956. Output was estimated to have fallen off approximately 12% to 25.5 million net tons valued at $212 million. Since the European export market remained virtually the same, the Bureau reasons, the drop in production can be attributed to the decrease in demand in domestic consumption and in shipments to Canada.

• **ENCOURAGING SIGNS**—The drop in tonnage does not necessarily represent an attrition in the hard coal market, Eastern States Retail Solid Fuel Conference states. Sales of relatively new automatic water-cooled grates for heating schools, apartment, and other large buildings showed an increase of approximately 18% in 1957. The new equipment, which radically reduces labor and maintenance costs, and burns the less costly sizes of coal, gives anthracite economy advantages, in comparison with other fuels, according to the conference.

A Case for Electrically Heated Schools

Parkside Elementary School in Hartford City, Ind., is laid out in the form of two wings. One wing covers approximately 15,040 sq ft, while the other covers approximately 15,730. The first wing was completed and put in use in the Fall of 1955 and the second in the Fall of 1956. Each classroom is equipped with thermostatically controlled electric unit ventilators, providing controlled ventilation, and, in addition, the kindergarten has radiant heating cables in the floor. The average annual degree days for Hartford City closely approximates 5600.

During the first heating season of 1955-56, the estimated electric consumption for heating was 133,480 kwh. At $.02 per kwh, the cost of $2,669.40 was higher than the $1,601.50 estimated for fuel oil at $.10 per gal. At first blush, this difference of $1,068.00 in favor of the combustion fuel might seem critical. However, we should note the reported economies in the elimination of one janitor at approximately $2800 per year, lowered depreciation rates, and a greater life expectancy of the equipment. Then, there was a saving of approximately $40,000 on initial plant cost through the use of the electric heating equipment. It is pointed out that this figure does not include additional savings represented in elimination of a smokestack, no excavation or basement, elimination of fuel storage facilities, and the addition of 33 sq ft to the library room. This school illustrates the greater flexibility of electric heating in planning future additions, and the ease with which varying heat requirements in different areas of the school can be handled.

Tillamook High School at Tillamook, Ore., is often referred to as the largest single electrically heated plant of its kind. There are 23 modern classrooms, administrative offices, cafeteria, shops, multi-purpose rooms, theatre type auditorium, and gymnasium. Classrooms, offices, library, cafeteria, and other smaller rooms are equipped with Ion-controlled electric heating units. Professor C. E. Clifton has stated that the bacteriacidal and sporicidal action of these units creates a reduced bacteria count in a room at a rate of 50% per hr. With the subsequent construction of a 9000-cu ft athletic locker building, there is an installed capacity of 1219 kw to heat the 1,832,388 cu ft of space. The 5247 degree days of Tillamook have been compared favorably with the degree days found from central to southern Ohio. Over a 5-year period, the average electric consumption per annum for the electric heating was 1,154,050 kwh. This represents an energy requirement of approximately .64 kwh per cu ft. It is interesting to note the saving in first cost of $24,000 in favor of the electric heating system over the originally planned combustion system, along with a $26,000 estimated saving in building construction costs, creating a total initial saving of $50,000.

In comparing annual operating costs, charges for fuel alone generally tend to favor the combustion fuel over electrical energy. But fuel consumed is only a part of annual operating cost. Consideration should be given to: (1) interest on investment in the heating plant; (2) depreciation; (3) fire insurance, based on the value of the installation and for the combustion plant which includes the boiler insurance and explosion insurance; (4) maintenance covering costs of labor and parts for repair or replacement, which should include all appurtenances necessary to operation of the combustion system, as well as the cost of more frequent decoration; (5) operating labor necessary to the combustion plant including the cost of engineering service to operate, inspect, or supervise operation, and, if a janitor is used, his time to be prorated along with attendant administrative cost; (6) operating expenses for material required by the com-

(Continued on page 165)

NEW FAIL-SAFE *Symmons*

TEMPTROL

Thermostatic Mixing Valve for Water

HAS REPLACEABLE CARTRIDGE

TEMPTROL – the new and only fail-safe thermostatic water mixer available with these outstanding features . . .

REPLACEABLE CARTRIDGE – which houses all working parts.

INSTANT SERVICE – Temptrol, with check stops, need never be removed from the line for costly servicing. A screwdriver to remove but four screws permits one to slip in new cartridge, if necessary—quickly—safely.

CONSTANT TEMP – hot water temperature is continuously and accurately maintained at all times.

ADJUSTMENT – temperature range from 90° all the way up to 180°.

AUTOMATIC – instant compensation for supply line temperature and pressure changes . . . safely shuts down on hot or cold failure.

INSTALLATION – can be installed at the heater as a Master Control, or anywhere along the line as a Zone Control.

CORROSION FREE – stainless steel control unit and electrolized sleeve assure extra long life and trouble-free performance.

ADDITIONAL PROTECTION – solid fill thermal element mounted out of the water in protected chamber open only to atmosphere.

AVAILABLE NOW – in four sizes: ¾", 1", 1¼" and 1½".

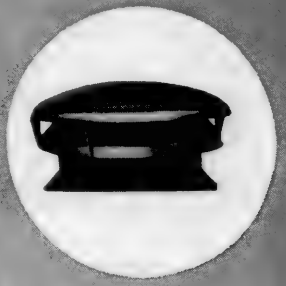
Truly a non-competitive item.

See SWEET'S ARCHITECTURAL FILE, DOMESTIC ENGINEERING CATALOG or write us direct for further information

Symmons
ENGINEERING COMPANY
445 C STREET, BOSTON 10, MASSACHUSETTS

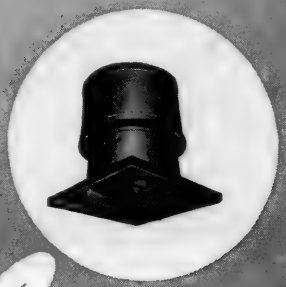
ACCEPTED *Allen*
ROOF VENTILATION

Whatever your ventilating needs, be sure to see how Allen equipment can meet your requirements efficiently and economically.



NEW "I-LINE" for EYE APPEAL

The new "I-Line" provides an attractive low contour, assuring maximum capacity or efficiency with the minimum over-all height.



POWERFUL "VD" for HIGH VELOCITY

By moving a large volume of air at high velocity, this Vertical Discharge fan keeps fumes from sifting back into building.

Allen

. . . is prepared to investigate ventilating problems and plan systems for the efficient removal of heat, fumes, vapor or dust.

WIND-DRIVEN TURBINES

Three types of Allen turbines take full advantage of the economy of natural air movement.

EXHAUST FANS

Remote drive Staxauster is designed to handle corrosive fumes, and/or high temperature air.

THE ALLEN LINE

Write today for catalog that gives specifications and performance data on these and other units in the Allen ventilator line.

ALLEN
ALLEN COOLER & VENTILATOR, INC.
ROCHESTER, N.Y.
Roof Ventilators for Every Commercial and Industrial Need
REPRESENTATIVES IN PRINCIPAL CITIES

These 5 big plus advantages prove you're right to choose

Power Line

for your industrial ventilation requirements

1. Complete line: Broadest product line of air-moving equipment for every industrial requirement.

2. Certified performance: All Power Line Fans are rated by PFMA and by NAFM.

3. Backed by 33 years of specialization in manufacture of highest quality ventilation equipment.

4. Competitively priced to give you important cost savings in initial investment and in maintenance. You get the precisely right product to fit your requirements. You don't over-buy with equipment too large or under-buy with equipment too small.

5. Sold only through qualified ventilation specialists. You get expert technical advice and service from the survey of your requirements right through to the completion of your installation.

YOURS ON REQUEST: Big 20-page Power Line Catalog gives complete facts about industrial ventilation, including selection of proper type and size of fan, calculation of duct resistance, and installation procedures, plus features, dimensions, specifications and performance data. Without obligation write for your free copy of Catalog No. 36.

POWER LINE FAN COMPANY, INC.

Subsidiary of Chelsea Products, Incorporated 639 South Avenue, Plainfield, New Jersey

NEW CATALOGS

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

STEAM REGULATING VALVES— Six-page Bulletin No. 1012 from Spence Engineering Co., Inc., Walden, N. Y., describes two series of steam regulating valves with pilots for both fast and slow heating exchangers. Instantaneous heaters require the T134 or T124 pilot which handle heater pressures up to 50 psi. The T14 pilot is designed for slow acting heaters to take full line pressures. The T14D pilot is used when heater pressures must be limited. Selection tables and line drawings of typical applications are shown.

Circle **Item 68** on Inquiry Card

CENTRIFUGAL FANS—A 4-page bulletin describing the construction, specifications, and operation of a new line of centrifugal fans, designed for heating, ventilating and air conditioning systems, is announced by Chicago Blower Corp., Franklin Park, Ill. The nine fans described in this booklet have been specially designed to meet air movement problems in locations where noise level is important.

Circle **Item 69** on Inquiry Card

V-BELT DRIVES—Dodge Manufacturing Corp., Mishawaka, Ind., has introduced a separate V-belt drive manual containing all V-drive information previously available in the company's general engineering catalog, No. D-56. Tables have been expanded to include more pre-engineered drives. Engineering drawings and exploded views illustrate technical sections of the comprehensive bulletin.

Circle **Item 70** on Inquiry Card

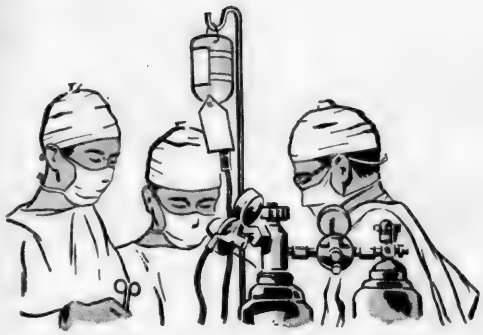
MOTORS IN AIR STREAM— Bulletin B-2505 from Reliance Electric and Engineering Co., Cleveland, Ohio, explains operation and economies of company's air-over motors in propeller and axial-flow fan applications. Motors increase in horsepower output, company asserts, in direct relation to the velocity of air swept over each motor frame surface by the fan it powers, within mechanical limitations.

Circle **Item 71** on Inquiry Card

PRESSURE REDUCING VALVES — A 20-page booklet, EN-656-PRV, published by Hoffman Specialty Mfg. Corp., Indianapolis, Ind., describes engineering aspects of pressure reducing valves including various designs and types, required data for valve selection, and good installation practice.

Circle **Item 72** on Inquiry Card

(Continued on page 150)



Blood Banks must NEVER FAIL...

Vital refrigeration units in St. Louis Blood Bank are powered by Wagner Motors

This 30 horsepower Wagner high torque, open type motor drives the refrigeration unit for the blood storage room in the St. Louis Blood Bank.

Wherever there is a motor application of a critical nature—even vital to life itself—Wagner Motors can be relied upon to fulfill their responsibility of completely dependable operation. In St. Louis' Blood Bank, for example, you'll find many Wagner Motors at work—driving the all important refrigeration units that keep the blood at proper storage temperature, that operate air conditioning compressors, that move heated and cooled air to keep the building comfortable in winter and summer.

Whether your motor application is vital to life or not, you can depend on Wagner Motors for efficient, reliable operation.

The complete line includes motors from 1/6 to 600 hp, singlephase or polyphase, in a wide variety of enclosure types and mountings. Let your nearby Wagner Sales Engineer help you select the right motors for your needs. Call the nearest of our 32 branch offices, or write direct.

Support your Local Blood Program by donating blood *regularly!*

Wagner Electric Corporation
SERVING INDUSTRY SINCE 1891

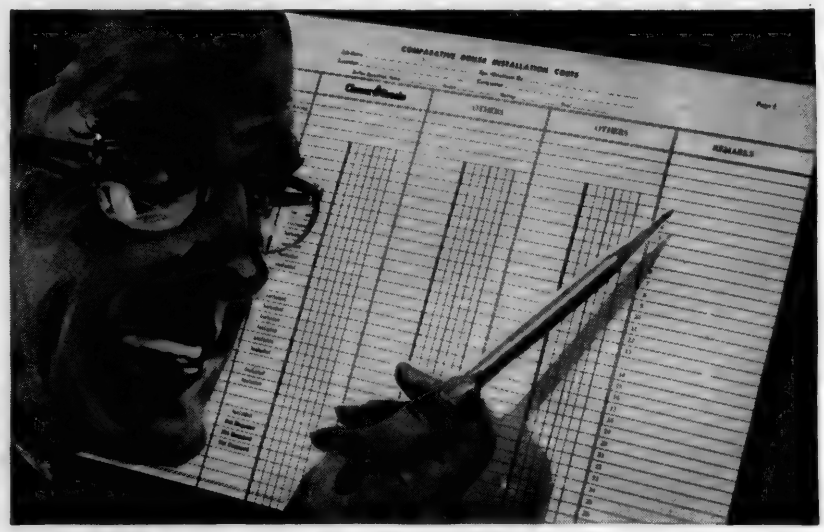
WH57-10

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

Wagner Electric Corporation
6463 Plymouth Ave., St. Louis 14, Mo., U.S.A.

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES • AUTOMOTIVE BRAKE SYSTEMS—AIR AND HYDRAULIC

Before you buy any boiler compare quoted prices with REAL COSTS



New Cleaver-Brooks cost analyzer clears "quotation" confusion — reveals ALL costs

Get *all* the costs . . . the *real* costs . . . down on paper before you recommend or specify a boiler to your clients. On many boiler installations "quoted prices" seldom agree with the total costs, as you may have learned. This is frequently the case with so-called "built-up" boilers assembled on the site.

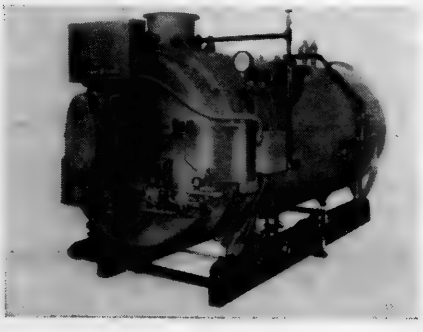
Cleaver-Brooks' cost analysis enables you to compare all material costs (boiler, steam trim, burner, refractory, controls and other equipment) and installation labor costs. You'll know the "real costs" on the complete installation before you start.

Real eye-opener

The figures you'll see may be startling. In most cases the cost analysis proves a Cleaver-Brooks costs *less*. On-job time is drastically reduced because Cleaver-Brooks packaged units are fully assembled, ready to install. Cleaver-Brooks boilers give you more in performance, too . . . each boiler is fully fire-tested at the factory under load, tuned to peak economy. Starting service and on-the-job operator training by authorized field engineers further decreases your over-all costs.

Contact your Cleaver-Brooks agent

Once you add up all the benefits of a Cleaver-Brooks "one-cost" package . . . the proved trouble-free economy of exclusive four-pass, forced-draft design, you'll find it pays over and over to analyze costs carefully before you buy. See your Cleaver-Brooks agent for details or write Cleaver-Brooks Company, 315 East Keefe Avenue, Milwaukee 12, Wisconsin. Dept. B



Choose from 19 sizes, 130 models, 15 to 600 hp. Oil, gas and combination oil/gas fired — steam or hot water for heating or processing.

Cleaver Brooks

ORIGINATORS OF SELF-CONTAINED BOILERS

NEW CATALOGS

(Continued from page 148)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

TEMPERATURE CONTROL VALVES — Six-page Bulletin J-180 describes Sliding Gate temperature control valves available from Jordan Industrial Sales Div., OPW Corp., Cincinnati, Ohio. The redesigned, strengthened thermal system is described as are valve features and method of operation. Bulletin contains sizing charts, dimensional drawings, control ranges, material specifications, and accessory items list.

Circle **Item 73** on Inquiry Card

PIPEWALL THICKNESS GAGES—Industrial Nucleonics Corp., Columbus, Ohio, announces a bulletin on portable pipewall thickness gages. The brochure, Bulletin No. N. E. 157, describes the operation of this lightweight (7½ lb), nondestructive method of determining the extent of corrosion, erosion, or scale buildup on pipe walls.

Circle **Item 74** on Inquiry Card

AIR MOVING EQUIPMENT LINE — Twenty-six pages of tables, charts, and diagrams compose Bulletin No. UVS-104 published by General Blower Co., Morton Grove, Ill. Complete engineering data are presented on the company's line of wide-range, low-cost air movers for ventilating and industrial applications.

Circle **Item 75** on Inquiry Card

CONTROL SERVICE MANUAL—For the installer and serviceman of heating and air conditioning equipment and controls, General Controls Co., Glendale, Calif., announces the latest printing of its popular B-60 Service Manual. This edition covers the installation, maintenance and service of the self-powered gas control system, including thermostats, pilot generators, and fan and limit controls.

Circle **Item 76** on Inquiry Card

ALL-PURPOSE AIR CONDITIONERS — Complete engineering information on the company's recently announced low pressure sprayed coil and high pressure dry and sprayed coil Climate Changers is incorporated in a revised catalog describing entire line of air handling units. The 56-page catalog provides detailed descriptions and illustrations on the all-purpose air conditioners for commercial, institutional, and industrial comfort and process applications. For a copy of Catalog DS-303, write on company letterhead to The Trane Company, La Crosse, Wis.

(Continued on page 152)

All WATERLOO

Registers and Grilles are tested and approved by

ANEMOSTAT® Laboratories

TESTED • APPROVED • ANEMOSTAT CORPORATION OF AMERICA

This smoke test picture, illustrating the exhausting of room air through Waterloo style 3H Return Air Grille, was taken in the Anemostat Laboratories in Hartford, Connecticut. It is one of a series of tests conducted by Anemostat research engineers to insure maximum efficiency of Waterloo equipment. In installations throughout the country, Waterloo registers and grilles are used with Anemostat air diffusers — a combination that results in top-quality performance.

Waterloo supply registers and grilles feature the exclusive silent flow "tear drop" louvre design. They are manufactured in a modern plant using the most efficient techniques, and every Waterloo unit is backed by 56 years of experience in air conditioning, heating and ventilating applications. • These, plus Waterloo's wide range line and fast service on specials, are good reasons why it pays to install Waterloo units in your next job.

Write for Waterloo Catalog, containing complete data.

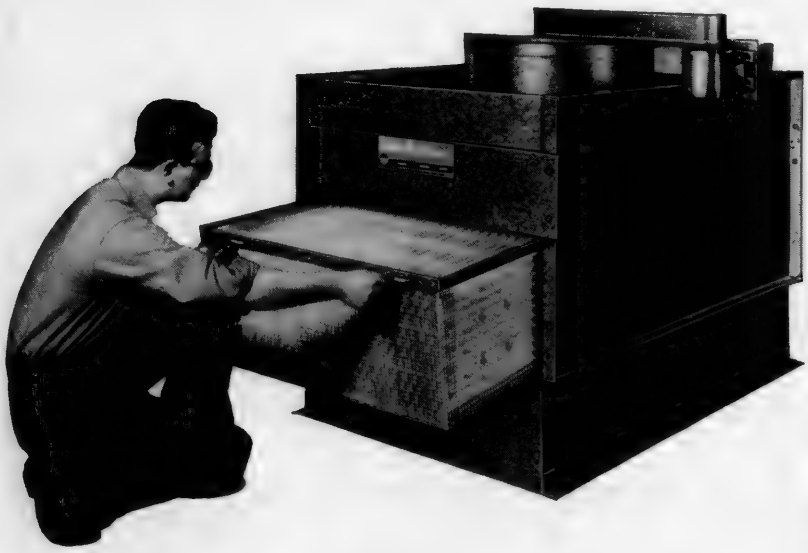
WATERLOO

REGISTER CO., INC.

WATERLOO, IOWA

WR-103

REGISTERS • GRILLES • VOLUME CONTROL DAMPERS • DOOR VENTILATORS



Puts big cooling tower features in small package

Binks' new Watertemp

Small, compact, economical in cost, operation and maintenance—Binks Watertemp cooling towers are ideal for air conditioning installations in the 5 to 60 ton range. Base dimensions for the largest unit are only 7'6" x 12' and maximum over-all effective height is 5'.

Efficient counter-current water and air flow. A dynamic and static balanced fan mounted at the top of the tower draws air up through the decking. Water is brought in at the tower top under low head and flows down over the multi-finned plastic decking. No nozzles are required to effect initial water break-up.

Heavily galvanized after assembly. Metal framework, panels and all attachments are heavily galvanized after assembly. Special hot-dipped galvanizing deposits a 20% heavier thickness than established as standard by Federal and A.S.T.M. specifications. No additional painting or coating is required.

Easy to install and maintain. Only a simple mounting foundation is needed to support the tower package. Heavy galvanizing cuts metal maintenance to almost zero. The plastic internal decking unit slides out for cleaning and makes routine inspection and maintenance of the tower an easy job.

Send for complete data. Ask your Binks Branch Office, or write direct for the new Watertemp Bulletin. For larger induced and forced draft cooling towers, ask for Bulletin 477-A (Binks 3-B series) and Bulletin 333 (Binks 2-K series). Binks engineers will be glad to answer your questions and help solve your particular cooling problems. There is no obligation.

7935

Binks
EVERYTHING FOR WATER COOLING

A COMPLETE LINE OF NATURAL DRAFT AND MECHANICAL DRAFT COOLING TOWERS AND INDUSTRIAL SPRAY NOZZLES

Binks Manufacturing Company
3120-38 Carroll Ave., Chicago 12, Ill.

REPRESENTATIVES IN PRINCIPAL U.S. & CANADIAN CITIES • SEE YOUR CLASSIFIED DIRECTORY

NEW CATALOGS

(Continued from page 150)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

INDUSTRIAL ELECTRIC HEATING — A booklet, entitled Industrial Electric Heating Units and Devices, is available from Westinghouse Electric Corp., Pittsburgh, Pa. The 24-page booklet, No. 27-620, describes a wide variety of heating units including strip heaters, oven heaters, and immersion heaters. Heating problems and their solutions are discussed with the aid of graphs and charts in the booklet's heater election guide. A complete line of compatible heater control equipment is also shown.

Circle **Item 77** on Inquiry Card

SUBMERSIBLE PUMPS— A comprehensive 32-page manual on the selection, installation, and maintenance of submersible pumps has been published by Rapidayton Division, The Tait Manufacturing Co., Dayton, Ohio. Both 2- and 3-wire submersible systems are covered. A check-chart of trouble-shooting information is included.

Circle **Item 78** on Inquiry Card

GLOBE-TYPE NEEDLE VALVES — Kerotest Manufacturing Co., Pittsburgh, Pa., has printed a four-page brochure outlining features of the company's new N-20 and N-28 globe-type needle valves. Presented are the numerous uses to which these valves may be put, pertinent technical data in chart form, and informative cutaway views and diagrams.

Circle **Item 79** on Inquiry Card

ELECTRIC MOTOR CONTROLS — An illustrated 56-page catalog from Furnas Electric Co., Batavia, Ill., makes electric motor control selection easy. Special Quick Selector tables giving horsepower, motor speed, heater size and heater ampere ratings are presented; in addition, Catalog 5800 contains design data, up-to-date prices, stocking information, and complete ordering instructions.

Circle **Item 80** on Inquiry Card

SEWER AND DRAINAGE PIPE — Available from The Hess-Snyder Co., Massillon, Ohio, is literature describing the company's bituminous fiber sewer and perforated pipe. Two folders are offered. One of these provides a comprehensive description of pipe characteristics and applications, including information on pipe installation and fittings. A second folder deals with specifications of the pipe from the engineer's or contractor's point of view.

Circle **Item 81** on Inquiry Card

(Continued on page 154)

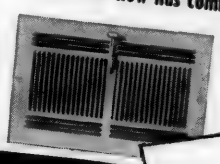
...condensed consumer reports
from the files of
standard
registers
and grilles

B-24 PERIMETER BASEBOARD DIFFUSERS

Mad Maud used to fume
When air blasts blew her from the room,
But B-24 changed her wrath to revel,
By maintaining comfort at a very high level!

PERIMETER BASEBOARD REGISTER NO. 551

Frozen Frank was in a snit;
found cold corners wherever he'd sit.
But with the 551's four way diffusion,
He now has comfort in profusion!



PH SERIES PERIMETER FLOOR REGISTERS

When Circle Sal entertained the ladies,
They found her home as hot as hades.
PH Registers restored her station,
Through perfect heat regulation!

CEILING AIR DIFFUSERS

Sinus Sam was a martyr true;
Stuffy air turned him blue,
'Til he put Ceiling Air Diffusers in.
Now he's in the pink again!

MORAL: If you want to keep
your customers happy
mail this coupon
and make it snappy!

STANDARD

...first in engineering for indoor comfort

STANDARD STAMPING & PERFORATING CO.
3141 W. 49th Place, Chicago 32, Illinois

Gentlemen: Please send me your new catalog showing the complete line of STANDARD STAMPING REGISTERS AND GRILLES.

Name_____

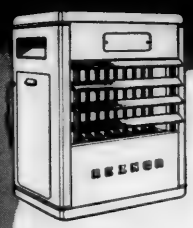
Company_____

Address_____

City_____ Zone_____ State_____

modern heating for business and industry...

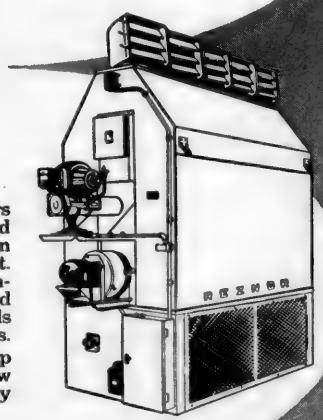
REZNOR UNIT HEATERS



SUSPENDED TYPE

Gas-fired—for use with natural, manufactured, mixed or LP gases. Eleven sizes: 25,000 to 300,000 Btu input. All sizes available with choice of propeller fan or centrifugal blower for air movement. FlexiTemp control system, featuring automatic two-speed fan operation, optional on propeller fan models up to 100,000 Btu. Aluminized steel construction standard, stainless steel optional at extra cost. These heaters are self-contained, completely automatic units for the production and distribution of heat at the point of need. Installation involves only suspension, utility connections and venting. Practically no maintenance required.

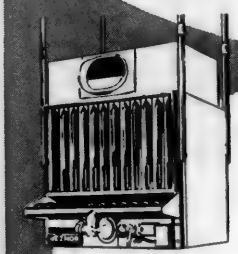
Floor-mounted models for use in offices and similar areas available in 25, 50, 65, and 75 thousand Btu sizes.



FREE-STANDING TYPE

These stainless steel direct-fired heaters are designed for large industrial and commercial space heating jobs. Ten sizes, 400,000 to 2,000,000 Btu input. Heaters can be equipped with gas burners (for natural, mixed, manufactured or LP gases), oil burners (for fuel oils through #5 grade) or dual-fuel burners.

Heaters may be floor-mounted for top discharge or suspended for down-flow or horizontal discharge. They are easily adapted for use in duct systems.



DUCT TYPE

Reznor duct heaters are compact, highly efficient gas-fired heat exchangers with a full complement of operating controls. They are designed for assembly in custom engineered duct systems with components for air moving, cooling and filtering specified to meet exact job requirements.

Series DS sectional duct furnaces (shown) are available in 4 sizes . . . 150, 200, 250, and 300 thousand Btu. Systems with capacities in excess of 2,500,000 Btu can easily be assembled using these four basic units. Aluminized or stainless steel construction. Accessory blowers available to meet most air delivery requirements.

there is no "equivalent" for Reznor unit heaters

for complete details, wherever you are . . . look for Reznor under "Heaters-Unit" in the Yellow Pages

REZNOR
WORLD'S LARGEST SELLING DIRECT FIRED UNIT HEATERS

Reznor Manufacturing Company
64 Union Street, Mercer, Pa.

NEW CATALOGS

(Continued from page 152)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

FUEL OIL CONTROL VALVE— A flyer, available from Atlas Valve Co., Newark, N. J., describes their adjustable cam, lever-operated valve for accurate metering control of fuel oil in industrial oil burner installations. The valve is designed to control and maintain a certain flow ratio between two variables such as air and fuel oil into an oil-fired steam boiler. Operating features, recommended applications and valve types, sizes and materials of construction available are included.

Circle **Item 82** on Inquiry Card

TRENCHING MACHINE—Parsons Co., Newton, Iowa, a division of Koehring Co., is distributing a 4-page color bulletin on their recently introduced Model 170 Trenchliner. A wheel-type trencher, the model digs 5¾-ft deep, 20 to 32-inches wide. Features described include hydraulically-driven conveyor, and hydraulic tilt mast.

Circle **Item 83** on Inquiry Card

CORROSION IN RETURN SYSTEMS — A bulletin describing Hagafilm, a filming type amine for controlling corrosion in steam condensate systems, is available from Hagan Chemicals & Controls, Inc., Pittsburgh, Pa. Publication points out the benefits of Hagafilm in controlling corrosion, removing iron oxide deposits, increasing heat transfer, reducing maintenance and replacement costs, and protecting steam condensate systems during standby periods. Included are a schematic drawing showing the critical points of protection in a condensate system, six brief factual case histories, and descriptions of company's corrosion test units and kits.

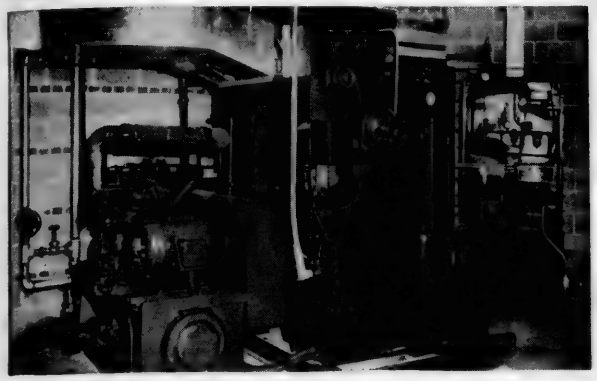
Circle **Item 84** on Inquiry Card

TUBULAR CENTRIFUGAL FANS — Fans combining tubular compactness with centrifugal performance are described in a catalog from Dryer Electric Corp., Brooklyn, N. Y. Application of tubular centrifugal fans to air conditioning, ventilation, and industrial processes is covered. The 16-page publication explains how the fans, despite external resemblance to axial fans, are true centrifugals in basic design and operation. Performance data, including low noise level and non-overloading characteristics, dimensions, and other specifications are given for direct or V-belt drive installations.

Circle **Item 85** on Inquiry Card

(Continued on page 156)

DRY AIR...
PRECISELY as you want it



NIAGARA CONTROLLED HUMIDITY AIR CONDITIONING

This method removes moisture from air by contact with a liquid in a small spray chamber. The liquid spray contact temperature and the absorbent concentration, factors that are easily and positively controlled, determine exactly the amount of moisture remaining in the leaving air. Heating or cooling is done as a separate function.

The Niagara's Controlled Humidity Method using HYGROL moisture-absorbent liquid is

Best and most effective because . . . it removes moisture as a separate function from cooling or heating and so gives a precise result constantly and always. Niagara machines using liquid contact means of drying air have given over 20 years of service.

Most reliable because . . . the absorbent is continuously reconcentrated automatically. No moisture-sensitive instruments are required to control your conditions.

Most flexible because . . . you can obtain any condition at will and hold it as long as you wish in either continuous production, testing or storage.

Easiest to take care of because . . . the apparatus is simple, parts are accessible, controls are trustworthy.

Most compact, taking less space for installation.

Inexpensive to operate because . . . no re-heat is needed to obtain the relative humidity you wish in normal temperature ranges and frequently no refrigeration is used to remove moisture.

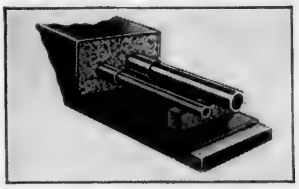
The cleanest because . . . no solids, salts or solutions of solids are used and there are no corrosive or reactive substances.

Write for full information; ask for Bulletins 112 and 121. Address Dept. HV-2.

NIAGARA BLOWER COMPANY
405 Lexington Ave., New York 17, N. Y.
District Engineers in Principal Cities of U.S. and Canada

THE BIG NEWS IS OUT!

NOW! ...there's a custom-built underground "Z-crete®" hot pipe insulating system for **your** need!

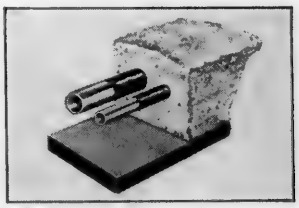


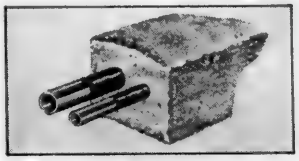
some jobs need

the supporting base pad and waterproofing envelope system... has strength, load bearing, and extreme water protection for bad ground and water conditions.

some jobs need

the base pad system. Provides a continuous stable base in uncertain soil, undependable fill ground conditions, when average water table level is below the bottom of the conduit.





some jobs need

the b-t-u system. No base pad or external waterproofing. For use where ground is uniform and stable and average water table level is below bottom of conduit.

...and Z-crete has them all!

Now you may choose a reliable Z-crete System for ANY size job, ANY sub-surface condition. Z-crete installations are made by authorized, trained applicators, licensed under Z-crete patents (U.S. #2355966, Canadian #439356). Continuing research and field tests have greatly extended the applicability of the Z-crete System. New blends of portland cement and admixes, and new structural methods, provide even greater water resistance, thermal values and structural strength.

FOR EASY DESIGN AND SPECIFICATION MAIL COUPON, GET TESTED DATA

ZONOLITE COMPANY, Z-crete Div., Dept. ACHV-28
135 S. LaSalle St., Chicago 3, Ill.
Send me Z-crete data folders Z-1 and Z-12.

*Name*_____

*Firm*_____

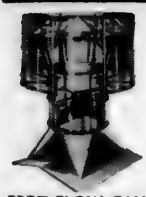
*Address*_____

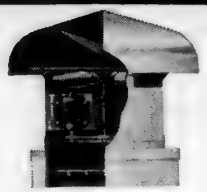
*City*_____ *Zone*____ *State*_____

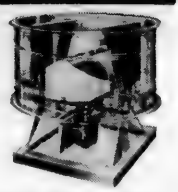
INSTALLED BY LICENSED APPLICATORS

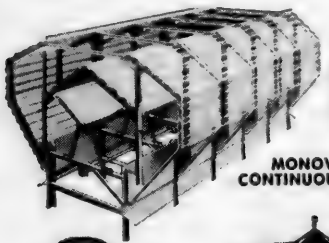
Burt

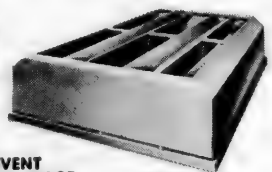
ROOF VENTILATORS
WALL LOUVERS


FREE-FLOW FAN

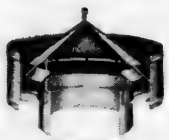

LOW TYPE


FREE EXHAUST FAN

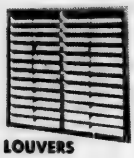

MONOVENT CONTINUOUS RIDGE


THERMOVENT

CENTRIFLOW


STANDARD GRAVITY

FREE-FLOW GRAVITY


LOUVERS

MONITOR TYPE

SEND FOR FREE DATA BOOK

BURT'S complete ventilator line includes a type and size to put air to work most efficiently and economically for your specialized needs. BURT'S engineering skill and know-how from more than half a century designing and building ventilators is your assurance of satisfaction. Your inquiry will receive prompt and qualified attention.

FAN & GRAVITY VENTILATORS LOUVERS • SHEET METAL SPECIALTIES

The Burt Manufacturing Company

49 E. South St., Akron 11, Ohio

MEMBER POWER FAN MANUFACTURERS ASSOCIATION

NEW CATALOGS

(Continued from page 154)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

WATER VAPOR INDICATOR—An eight-page bulletin describing the Aminco water vapor indicator, an instrument for measuring the water vapor content of compressed gases, is available from American Instrument Co., Inc., Silver Spring, Md. The indicator was developed to inspect aviation breathing-oxygen supplies. It is also used to determine the dryness of refrigerants and for studying the evolution of water resulting from chemical or physical changes. The bulletin, No. 2301, includes application photographs of the instrument, schematics, and flow diagrams, in addition to a table which lists the properties of partially saturated air-water vapor mixtures.

Circle **Item 86** on Inquiry Card

REFRIGERANT SOLENOIDS—Controls Company of America, Milwaukee, Wis., has released bulletins on its new line of solenoid valves, Models 271, 272, 273 and 274. The four valves were designed specifically for liquid and suction line refrigerant application, hot gas defrost installations, and for controlling water flow. Complete dimensions, valve specifications, capacities, and coil kit replacement charts for the different models are given in the bulletins.

Circle **Item 87** on Inquiry Card

PACKAGED AUTOMATIC BOILER — A 6-page bulletin describing operation of the Powermaster packaged automatic boiler is available from Orr & Sembower, Inc., Reading, Pa. The boilers discussed are both air- and pressure-atomizing types for oil and gas burning. The bulletin provides a chart listing ratings, dimensions, weights, and approximate fuel consumption figures for the packaged units.

Circle **Item 88** on Inquiry Card

TIME SWITCH SELECTION— Specific are the questions answered by the new Quick Selector chart distributed by Tork Time Controls, Inc., Mount Vernon, N. Y. The 17 by 22-inch chart is made available for counter or wall display to make possible instant selection of the time switch needed for a particular installation. Five standard dials are illustrated on the left side of chart with a brief explanation of their applications and uses. In color columns to the right of the dials are model numbers for various time switch types which apply. Information on lug terminals, enclosures, 240-v motors, and special equipment completes the panel.

Circle **Item 89** on Inquiry Card

(Continued on page 158)

for your convenience / **SPRAY NOZZLES**
and all related accessories for
HUMIDIFYING / from a single, dependable source

PRECISION PNEUMATIC ATOMIZING NOZZLES

ACCESSORIES SUCH AS AIR FILTERS, HUMIDISTATS, SOLENOID VALVES, PRESSURE REGULATORS

COMPACT HUMIDIFYING UNITS

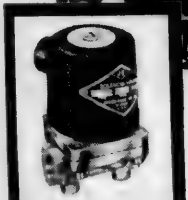
For industrial installations of every size Spraying Systems offers all needed equipment . . . everything but the piping, wiring and compressor. Provides high efficiency, dependable system; only two components have moving parts. Engineered for easy installation and simplified maintenance.

WRITE FOR Bulletin 82 . . . spray nozzles, assemblies and parts for manual or automatic humidifying systems.

ALSO SUPPLIED . . . spray nozzles for evaporative condensers, air washers, cooling towers, spray ponds and roof cooling systems.

SPRAYING SYSTEMS CO.
3261 RANDOLPH STREET • BELLWOOD, ILLINOIS
ADVANCED SPRAY NOZZLE DESIGN FOR NEW DIMENSIONS IN CONTROL AND PERFORMANCE

In the fabulous Americana Hotel, Miami Beach



J-E SOLENOID VALVES
Quietly and *Dependably* Control the Personalized Air Conditioning in 475 Guest Rooms

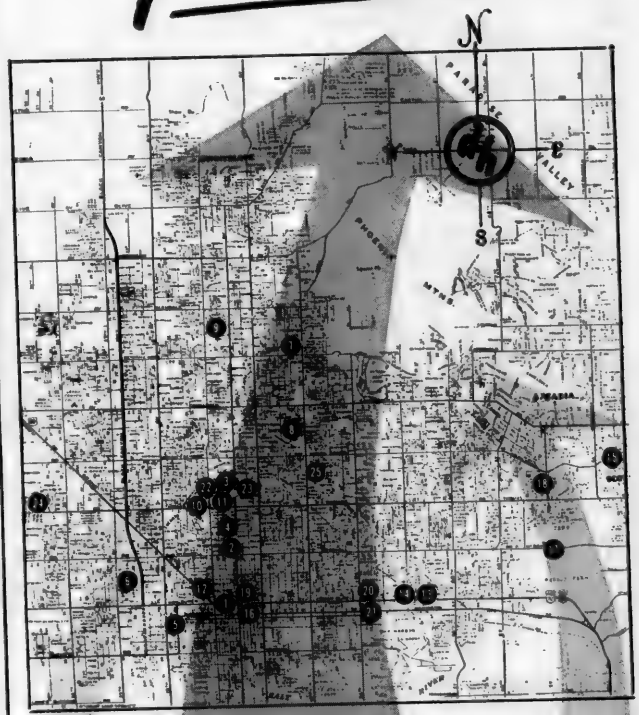
Owned and operated by Tisch Hotels, Inc., the Americana has individually-controlled air conditioning, for heating or cooling, in every guest suite. To assure quiet, dependable, personalized control of room temperatures, the air conditioning contractor (Hill York Sales Corp.) selected Jackes-Evans Solenoid Valves.

For complete satisfaction on *your* jobs also, *specify* J-E Valves. Call your wholesaler or write direct today.

Controls Division
JACKES-EVANS MANUFACTURING COMPANY
[illegible] • St. Louis 15, Mo.

courtesy **DRAYER-HANSON** *and* **E. B. BOMAR** (SALES AGENT)

AIR-CONDITIONED
Phoenix!



1. First Presbyterian Church
2. Central Methodist Church
3. 3300 Building
4. Central Medical Bldg.
5. Arizona State Highway Dept.
6. Carl Hayden High School
7. Rose Lane School
8. Madison School No. 5
9. Madison School No. 6
10. St. Joseph Nurses Home
11. First National Bank, Thomas & Central Branch
12. Egyptian Motel
13. Sands Motel
14. Highway House Motel
15. Valley Ho Motel, Scottsdale
16. Down Town Motel
17. Motorola Research Lab.
18. Motorola Western Electronic Center
19. Republic & Gazette Newspaper
20. Arizona State Hospital
21. Flamingo Motel
22. Park Central Shopping Center
23. Central Investment Co.
24. Banks Medical Bldg.
25. KTVK Television Studios

The Burst-At-The-Seams activity that is [illegible] Phoenix, Arizona, can best be measured by [illegible] ersified Drayer-Hanson air conditioning inst[illegible] recently sold by the E. B. Bomar organization [illegible] Madison Street, Phoenix . . .

One of D-H's live-wire local area Te[illegible]y to assist in your engineering-applic[illegible] problems.

Request name of Sales Agent nearest you

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DIVISION OF NATIONAL-U.S. RADIATOR CORP.
3301 MEDFORD STREET
LOS ANGELES 63, CALIFORNIA
CABLE: FORTRADE LOS ANGELES

for DUST

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install

FLEXAUST®

HOSE

Made of strong neoprene coated cotton or nylon fabrics spiral wire reinforced.
For *all* kinds of dust collecting uses, particularly good for elbows and moving hoods.
Exceptionally easy to cut, install, connect, reuse, and relocate.
Sizes 1¼" thru 36" i.d.

Write for details today
Distributors
in all principal cities

THE FLEXAUST COMPANY
Dept. HV-2
PARK AVE. NEW YORK 17 N.Y.

NEW CATALOGS

(Continued from page 156)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

REGISTERS, DIFFUSERS, GRILLES — A catalog showing the company's line of registers, diffusers and grilles has been released by Air Control Products, Inc., Coopersville, Mich. Company states the catalog is produced, in full color with large product illustrations, to enable the heating and air conditioning contractor to do a better job of showing his prospects what they are being asked to buy. It also includes all the information the contractor needs including selection charts and engineering data.

Circle **Item 90** on Inquiry Card

CONCRETE FASTENERS — A large Reddi-Reference chart, distributed by Phillips Drill Co., Michigan City, Ind., pictures the company's Red Head concrete fasteners in full size and in all types—snap-off end, flush end, stud anchor, rod hanger, tie wire and clinch nail. The chart also shows company's chucks and has diagrams giving instructions for installing concrete fasteners by hand or impact hammer. Load-holding figures are given.

Circle **Item 91** on Inquiry Card

STEEL HEATING BOILER— Portmar Boiler Co., Inc., Brooklyn, N. Y., has issued a descriptive 4-page brochure of its TP Series, three-pass steel heating boiler for today's large structures. Illustrations show how the three-pass system extracts full usable heat for steam and hot water. Dimensional and capacity data are included.

Circle **Item 92** on Inquiry Card

ALL-PURPOSE CONTROLS—Simple all-purpose electrical controls, known as Versatrols and suitable for use with virtually any detectable variable, are described in a 12-page bulletin issued by Assembly Products, Inc., Chesterland, Ohio. Bulletin 106 explains applications of the most common control circuits, both automatic and limit, including use of the company's Load Sentry overload control.

Circle **Item 93** on Inquiry Card

GAS-FIRED AIR CONDITIONER — Available from Arkla Air Conditioning Corp., Evansville, Ind., is a 4-page bulletin describing the Sun Valley year-around gas-fired air conditioner. In addition to presenting advantages of gas-heat energy source, absorption-refrigeration principle, bulletin gives complete specifications for 3½ and 5-ton models.

Circle **Item 94** on Inquiry Card

(Continued on page 160)

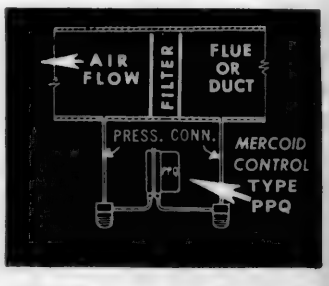
EXTREMELY
"Sensitive"
DIFFERENTIAL PRESSURE
Control
BY
MERCOID

Has Hermetically Sealed Magnetic Mercury Switch

FOR AIR OR GAS
(INCHES OR FRACTION OF INCHES OF WATER)

For low pressure or vacuum—to "make" or "break" electrical circuits on small changes in the difference between two pressures. Examples: to indicate a change in resistance through a filter (see illustration); to indicate a change in differential due to a change in air flow conditions; to indicate interruption of air flow.

This control incorporates two pressure chambers separated by a sensitive diaphragm. Each chamber is connected to a separate pressure source and the control is set to operate as the relationship of the two pressures change.



OPERATING RANGES—6" vacuum to 6" pressure (sensitivity .03") and 30" vacuum to 30" pressure (sensitivity .1" to .2").

CIRCUIT ARRANGEMENTS—several models available to accomplish the following operations:

SPST—USING ONE MAGNETIC SWITCH—open or close switch contact either on an increase or decrease at pressure difference.

SPST—USING TWO MAGNETIC SWITCHES FOR TWO STAGE OPERATION. Open/close both switch contacts on an increase in pressure difference.

Open one contact on increasing pressure difference and one on decreasing pressure difference.

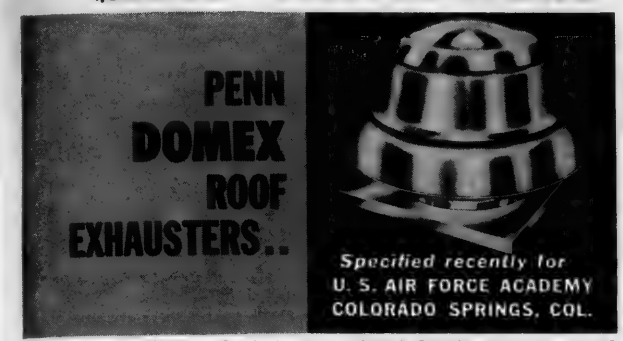
Close one contact on increasing pressure difference and one on decreasing pressure difference.

CASE STYLES—three types to meet following conditions: Indoor (general purpose), Outdoor (weather resistant), and Hazardous locations (explosion-proof).

WRITE FOR BULLETIN No. 14N

THE MERCOID CORPORATION
4211 Belmont Ave., Chicago 41, Ill.

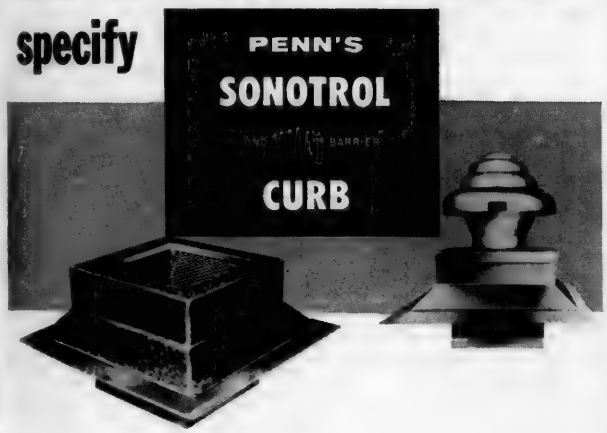
here's SOUND ADVICE on effective ROOF VENTILATORS



. . feature . . Skyline Stylishness . . High Performance . . and durable, bright aluminum housings.

Domexes recent development is the "Significant Scroll", a deep, one-piece spun inlet—exclusive with Penn RB and QB series—providing *proper design*, quiet operation and certified capacities.

and for SOUND CONTROL specify



. . A factory fabricated roof curb combining structural stability and sound attenuating quality definitely superior to field constructed curbs. The Sonotrol is priced competitively with on-the-job constructed curbs, it also defines and stabilizes dimensions. It is an excellent companion piece for all motor driven exhausters. The Penn Ventilator Man in your area has complete details. Contact him for a copy of the Electrical Testing Laboratories' report on the Sonotrol Curb.

Detailed information on the Domex and Sonotrol Curb is available from your local representative or write direct.

PENN VENTILATOR CO. Inc.

PHILADELPHIA 40, PENNA.

Representatives and Distributors in Principal Cities.

LOW-COST HEAT ZONING

easy-to-install ZONVALVE®

Now — the comfort of multiple-zone heating at a fraction of the former cost. ZONVALVE, new thermostatically-controlled motorized valve, replaces ordinary radiator valve *without plumbing change.* On new installations, ZONVALVES can be installed on radiators or branch lines.

Easily installed. Made in all standard pipe and tubing sizes. Low-voltage wiring permits placement of thermostat where most effective and convenient, with *low wiring cost.*

Opening of ZONVALVE automatically actuates burner or circulator.

ZONVALVE is designed for use on steam and hot water systems.

Ideal for private homes, factories, office buildings, hotels and motels.

HEAT-TIMER CORPORATION D-2

657 BROADWAY • NEW YORK 12, N. Y.

Please send me full details on ZONVALVE.

Name..... ☐ Jobber ☐ Contractor-dealer

Address.....

City.....Zone.....State.....

installing

A SIMPLEX
RADIANT-ACOUSTICAL CEILING

complete integration for
• economy • comfort • efficiency

The environmental control "package" you have been looking for.

This ceiling does the complete job of heating, cooling and ventilating with one medium—air, while providing acoustical insulation, attractive concealment for overhead services and support for recessed lights.

Economy
– Smaller ducts and fans due to a ⅓ saving in air quantities.
– Permanent aluminum ceiling finishes.
– Air diffusers eliminated.
– Rapid, *one trade* installation.

Comfort
By using only air, SIMPLEX combines:
– the speed of response of forced air systems, with
– the superior comfort of radiant heating and cooling.

Saves Space
– Smaller ducts allow shallower plenum spaces. *Saves on building height.*
– All floor space is free for use by building occupant.

Also—no SIMPLEX radiant-acoustical ceiling has ever caused condensation!

Send today for folder with complete specifications, photographs, and details. Simplex Ceiling Corp., 552 W. 52 St., New York 19, N.Y.

SIMPLEX
Ceiling Corp.
552 West 52 St., New York 19, N. Y.
Please send me folder describing the Simplex all air radiant-acoustical ceiling.
Name.....
Firm.....
Address.....
City.....Zone...State.....

NEW CATALOGS

(Continued from page 158)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

HYDRONIC PERIMETER HEATING — A full color bulletin, Form No. 955, issued by National-U. S. Radiator Corp., Johnstown, Pa., describes its Sunray cast iron baseboard heat distributors. Designed for use of contractors and builders who need literature for their customers, bulletin describes and explains hydronic perimeter heating from the viewpoint of the housewife. In addition, compatibility of summer air conditioning with baseboard heating is pointed out in the bulletin, which also contains rating and dimension data.

Circle **Item 95** on Inquiry Card

CERTIFIED FAN RATINGS — Technical Bulletin 153-57 entitled AMCA Certified Ratings gives details of the new industry-wide program designed to help specifiers of air moving equipment—centrifugal, axial and propeller fans, and power roof ventilators — to identify air moving equipment certified to perform according to published performance ratings based on official tests. Typical test set ups and performance curves for fans are included in the bulletin released by Air Moving and Conditioning Association, Detroit, Mich.

Circle **Item 96** on Inquiry Card

LABORATORY DRAINAGE SYSTEMS — Bulletin No. 3, Specification for Lead Chemical Laboratory Drainage Systems, is released by Architectural Department, Lead Industries Association, New York, N. Y. Specification was prepared for the guidance of architects, engineers and plumbers in designing chemical laboratory drainage systems for both industrial and educational facilities. Detailed drawings of suggested methods of installing lead waste lines for wall laboratory tables and center laboratory tables with center troughs and end sinks are included.

Circle **Item 97** on Inquiry Card

SCHOOLROOM CONDITIONING — An illustrated catalog, No. UV-1157, covering application, design, and construction of Schoolmaster unit ventilators is announced by The Rittling Corporation, Buffalo, N. Y. The importance of correlating all phases of cooling, ventilating, heating, and filtering, and their effect in establishing healthful schoolroom climate are outlined. Dimensional data, and steam and hot water capacity ratings under typical conditions are given for the five unit sizes.

Circle **Item 98** on Inquiry Card

(Concluded on page 162)

TAKE THE GUESSWORK OUT OF ESTIMATING

High Velocity Air Movement Systems

IN ONE COMPLETE PACKAGE

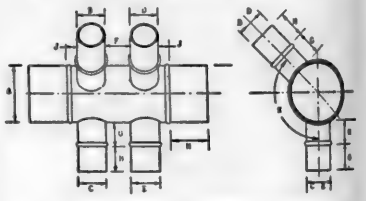
1 SPIRAL *Lockseam* PIPE

Spiral pipe, matched fittings and sound absorbers . . . all custom made to cut costs . . . quicken and pin-point estimates. Next time, specify United's spiral pipe fittings and sound absorbers . . . all in one complete package.

Spiral Pipe Standards and Sizes

• 26 gage zinc-coated steel — diameters 3" through 8" • 24 gage steel—9" through 22" • Standard length 12'—lengths to 20' if required • Available in any specified metal 20 to 30 gage

2 MATCHED FITTINGS
AVAILABLE FOR EVERY SPIRAL PIPE DIAMETER



3 SOUND ABSORBERS
HIGH PRESSURE
LOW FRICTION LOSS

Write For Free Catalog
Showing Detailed Specifications and Applications

UNITED
Sheet Metal Co.
549 S. Drexel Ave. Columbus 9, Ohio
Telephone: BElmont 5-3495

Established Line of Heating Equipment

now available to

DISTRIBUTORS

A nationally famous furnace manufacturer, operating successfully from coast to coast, is planning to make its line of popular heating equipment available to qualified distributors.

Capital investment commensurate with the size of territory will be required.

Inquiries will be handled in strict confidence.

ADDRESS BOX 1148

Chicago, Illinois

HARRIS FLOATS

for any liquid—for high pressures—for high temperatures

If you have a liquid level control problem that involves a float, send for Harris Float Catalog with its complete technical data on the various types and sizes of floats, and the metals suitable for different corrosive liquids, temperatures, and pressures.

Harris Floats are made in sizes from 2½" to 14" diameter in ball, cylinder, conical, rectangular or disk shapes of Copper, Stainless Steel, Aluminum, Nickel, Monel, or Steel or other suitable, workable metals.

Harris engineers, with a background of 72 years of experience, will be glad to help you select or design the right float for your installation.

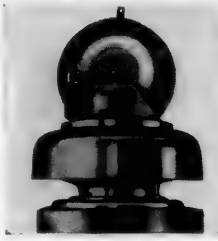
Write today for Harris Float Catalog with complete technical data.

ARTHUR HARRIS & CO.

206 No. Aberdeen Street, Chicago 7, Illinois

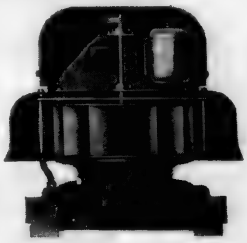
Uniform appearance

All-aluminum construction, in COOK *belt and direct drive models*

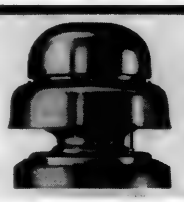


Belt Drive Centrifugal Model CB, Capacities to 13,939 cfm

Even Drive Assembly Is All-Aluminum No Steel.

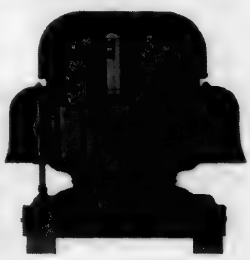


Only 39" high in largest size. Adjustable sheaves give wide choice of tip speeds and cfm. Light starting torque with all-aluminum blower wheel. 13,939 cfm size weighs only 280 lb.

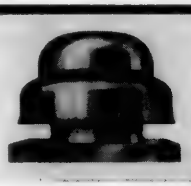


Direct drive Centrifugal Model CD, Capacities to 10,263 cfm

Ample air supply to motor chamber.

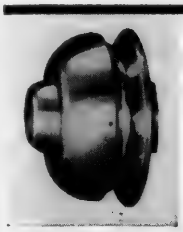


All aluminum, even solid aluminum supporting posts. Discharge direct—no additional static created. Motor assembly vibration isolated. Non-overloading, aluminum wheel.



Direct Drive Propeller Model FD, Capacities to 4,020 cfm

Pressure type aluminum propeller. Deep spinning means unrestricted air flow. Power assembly floats on vibration isolators. Venturi-type outlet prevents backdraft.



Direct Drive Wall Ventilator Model W, Capacities to 2,580 cfm

Outer baffle makes unit completely weatherproof. From 7" to 18" wheel—all aluminum—backwardly inclined. Weatherproof sealer on mounting flange. Round duct work is easily attached.

Patent No. 2805615

Pressure Relief Ventilator Model PR, from .1964 to 5.157 square foot throat area

Inverted cone guides air flow—reduces turbulance.

Large outlet area reduces pressure loss.
One-piece spun aluminum weatherproof top cap.
One piece spun aluminum base.

Ratings in accordance with standard test code by Texas Engineering Experiment Station, an approved AMCA test laboratory.

Write for Catalog, or see our condensed catalog 20c/CO *in Sweet's Architectural File.*

COOK **LOREN COOK COMPANY**

Berea, Ohio

In Canada write to H. F. Clarke, Ltd., 421 West Broadway, Vancouver, B. C.
Ventilators CB, CD & W are CSA Approved

AirMpeler

LO-BOY
CENTRIFUGAL
ROOF EXHAUSTERS

Enhance The Beauty Of Building Skylines

Pats. Pend.

Lowest Silhouette Design

FORWARD OR BACKWARD CURVE WHEEL WITHIN . . . . OR OUT OF SCROLL HOUSING

Motor mounting on side of structure support . . . out of line of air stream reduces height of Lo-Boy models nearly 50% of older designs.

LOW WIND RESISTANCE
SIZES 10"-72" 600-47,000
CERTIFIED C.F.M. RATINGS

- QUALITY
- BEAUTY
- PROVEN PERFORMANCE

See Sweet's File 20c/Amm or Write for bulletin AC100-58

AMMERMAN CO., INC.
109 North Second St.
Minneapolis 1, Minnesota
MEMBER OF THE AIR MOVING & CONDITIONING ASSN.

NEW CATALOGS

(Concluded from page 160)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

ADJUSTABLE SPEED DRIVE—The Louis Allis Co., Milwaukee, Wis., has published a 12-page bulletin, No. 2000, on the Select-A-Spede adjustable speed drive. This unit, available from 5 to 200 hp, is a variable-voltage d-c drive that uses a-c as its power source. Applications are discussed and illustrated in the bulletin; also stressed are ease of installation, optional features for special applications, and savings that can be effected through use of this drive.

Circle **Item 99** on Inquiry Card

PIPE INSULATION CALCULATOR — A handy slide-type calculator for pipe insulation is available from Union Asbestos & Rubber Co., Bloomington, Ill. Called Fact Finder, it permits the user to quickly and easily select the most economical thickness of pipe insulation. It gives the insulation surface temperature and the Btu loss per lineal ft per hr for various insulation thicknesses on pipe ranging from one to 24-inch dia at temperatures from 300 to 1200 deg F.

Circle **Item 100** on Inquiry Card

WELDING SUPPLIES, ACCESSORIES — A 48-page catalog describing supplies and accessories for gas and arc welding is available from Air Reduction Sales Co., a division of Air Reduction Co., Inc., New York, N. Y. Included in Form ADC-848B, which contains over 100 illustrations, is information on ferrous and non-ferrous welding rods for oxyacetylene welding and Heliwelding; welding and brazing fluxes and their applications; aluminum welding fluxes; silver brazing alloys; and protective equipment.

Circle **Item 101** on Inquiry Card

POWER EXHAUSTERS— Bulletin 58-A, a catalog describing the company's complete line of power exhausters, is issued by Jenn-Air Products Co., Inc., Indianapolis, Ind. Line includes many new models with capacities up to 23,000 cfm. Complete capacity table and specifications for each type of unit are included.

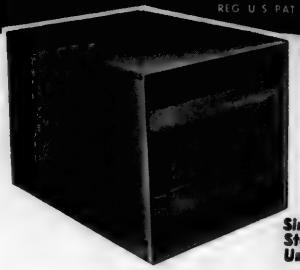
Circle **Item 102** on Inquiry Card

THE STORY OF WATER—A 28-page illustrated booklet published by Franklin Electric Co., Inc., 350 E. Spring Street, Bluffton, Ind., and titled Beyond The Water Mains, outlines the history of man's search for water and his development of mechanical means of delivering it for domestic uses. The booklet sketches the story of water from Genesis through current times. Single copies are available by request on business stationery.

COMPACT . . LIGHTWEIGHT . . STREAMLINED AND ACOUSTICALLY EFFICIENT

NO JOB WAITS FOR

UNI-SILENCER
REG. U.S. PAT. OFF.



Single Unit Standard Uni-Silencer

THE NEW SILENCER FOR AIR CONDITIONING AND VENTILATING SYSTEMS!

UNI-SILENCERS* and UNI-RESONATORS* have been designed specifically to reduce the airborne noise generated by fans in industrial ventilating and air conditioning systems. Low in cost from both the original purchase and installation view, Uni-Silencers are delivered in cartons weighing about 75 lbs. each. They may be easily and inexpensively transported into the building, to the specific location required.

UNI-SILENCERS* compare favorably in cost with conventional duct lining.

When air flow, pressure drop, or noise attenuation require the use of more than one Uni-Silencer, then units (singles, halves or quarters) may be set together using built-in slip joints. Thus in series, or in parallel Uni-Silencers will fit any condition or requirement.

3 Uni-Silencer singles and 3 half units set together in a block for efficiency

UNI-SILENCERS* are supplied in 3 sizes: Full Unit—24x24x32"; Half Unit—12x24x32"; Quarter Unit—12x12x32".

UNI-SILENCERS* are sold on a *guaranteed* basis. Interior and exterior surfaces are smooth, made of perforated and unperforated metal to reduce resistance to a minimum.

Complete engineering services is yours, FREE!

*Reg. U.S. Pat. Off.

Fill out and mail coupon for literature today!

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WRITE FOR BULLETIN B-9

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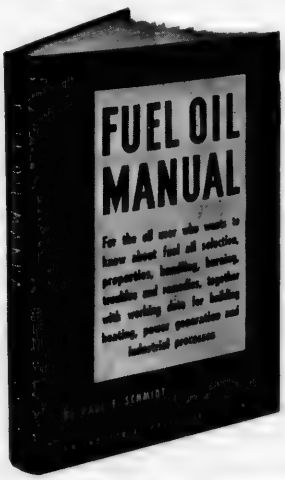

Here is a book that will give you a comprehensive picture of the characteristics and uses of every type and grade of fuel oil. The author explains the meaning of each oily property, and shows how this information is applied to the selection, handling and burning of fuel oil. Impurities and how they effect combustion are described fully, and a special chapter describes fuel oil additives and how they are used. Another chapter lists troubles which may be encountered in using fuel oils, and shows the correct remedy to apply in each case. Technical language is avoided wherever possible and all terms are fully explained.

160 Pages **$3.50** 34 Tables

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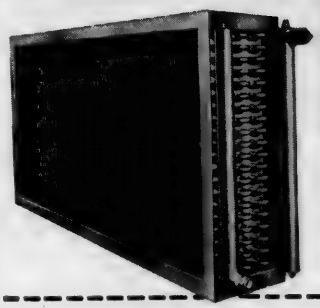

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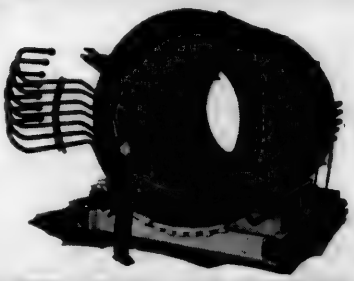

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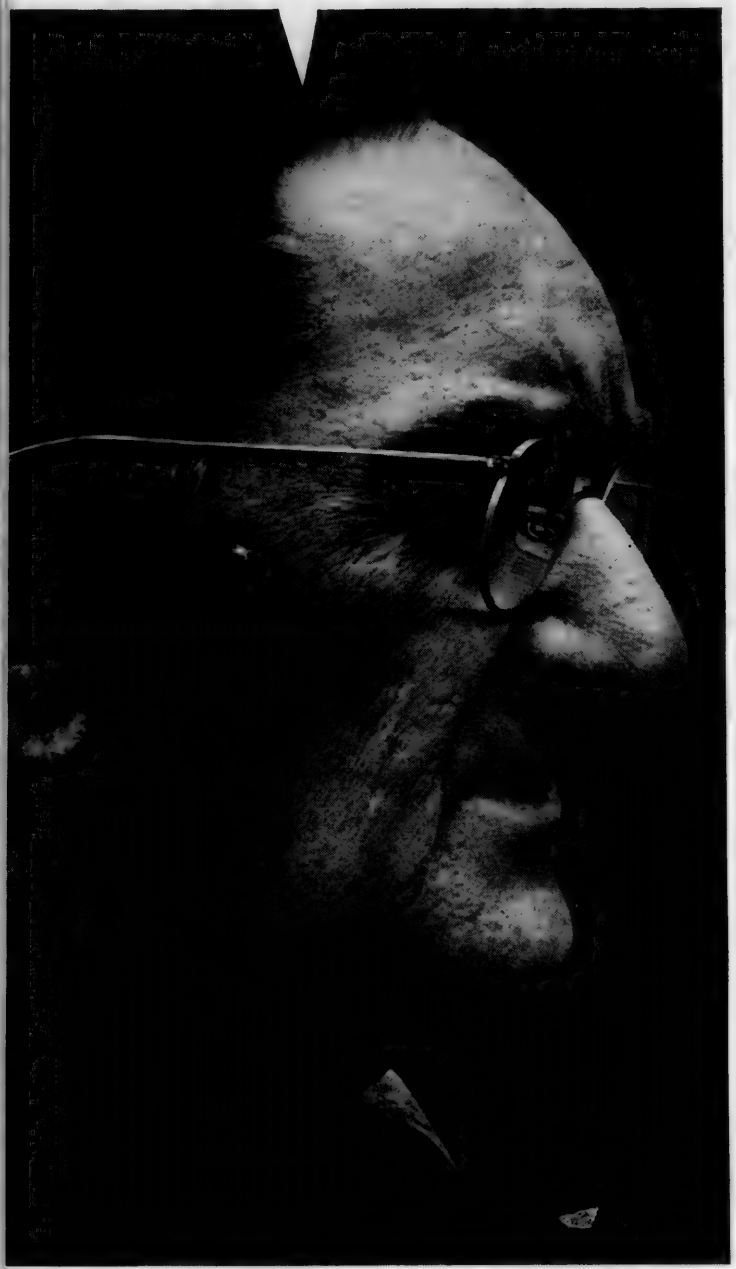
says Ernie Kolpin



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COMING EVENTS

Where listed, names or titles of individuals are those from whom further information is available

INDUSTRIAL VENTILATION CONFERENCE—7th annual Industrial Ventilation Conference, sponsored by the Michigan Department of Health, and the Department of Mechanical Engineering and Continuing Education Service of Michigan State University to be held at Kellogg Center, Michigan State University. Chairman of the Conference, Continuing Education Service, Michigan State University, East Lansing, Mich. .....**FEBRUARY 17-20, 1958.**

AIF ATOMIC EXPOSITION—AIF AtomFair exhibition, at the Chicago Amphitheatre, Chicago, Ill., sponsored by American Institute of Chemical Engineers. Secretary of the Institute, 25 W. 45th St., New York 36, N. Y. .....**MARCH 17-21, 1958.**

NACE CONFERENCE—14th annual conference of the National Association of Corrosion Engineers, at the Civic Auditorium, San Francisco, Calif. A. B. Campbell, executive secretary of the Association, 1061 M & M Bldg., Houston 2, Texas. **MARCH 17-21, 1958.**

NUCLEAR CONGRESS—1958 Nuclear Engineering and Science Conference in Chicago, Ill. Engineers Joint Council, 29 W. 39th St., New York 18, N. Y. .....**MARCH 17-21, 1958.**

NEW ENGLAND GAS MEETING—Annual meeting of the New England Gas Association, at the Hotel Statler, Boston, Mass. Clark Belden, managing director of the Association, 10 Newbury St., Boston 6, Mass. .....**MARCH 20-21, 1958.**

POWER CONFERENCE—20th anniversary meeting of the American Power Conference, at the Hotel Sherman, Chicago, Ill. R. A. Budenholzer, mechanical engineering department, Illinois Institute of Technology, 3300 Federal St., Chicago 16, Ill. . .**MARCH 26-28, 1958.**

GAMA MEETING—Annual meeting of the Gas Appliance Manufacturer's Association, at The Greenbrier, White Sulphur Springs, W. Va. Secretary of the Association, 60 E. 42nd St., New York 17, N. Y. .....**MARCH 31-APRIL 2, 1958.**

BRI MEETING—Seventh annual meeting of the Building Research Institute, at the Shoreham Hotel, Washington, D. C. C. R. Koehler, Publicity, BRI, 2101 Constitution Ave., Washington 25, D. C. ....**APRIL 21-23, 1958.**

AIHA CONVENTION—19th annual meeting of the American Industrial Hygiene Association at the Claridge Hotel, Atlantic City, N. J. G. D. Clayton, executive secretary, 14125 Prevost, Detroit 27, Mich. .....**APRIL 21-26, 1958.**

AIR-CONDITIONING AND REFRIGERATION MEETING—Annual meeting of the Air-Conditioning and Refrigeration Institute, at The Homestead, Hot Springs, Va. Secretary of the Institute, 1346 Connecticut Ave., N.W., Washington 6, D. C. .....**MAY 4-7, 1958.**

MECHANICAL CONTRACTORS CONVENTION—69th annual Convention of the Mechanical Contractors Association of America, Inc., at the Ambassador Hotel, Los Angeles, Calif. L. B. Gruman, executive secretary of the Association, Suite 570, 45 Rockefeller Plaza, New York 20, N. Y. .....**MAY 20-23, 1958.**

NDHA CONVENTION—49th annual meeting of the National District Heating Association, at the French Lick-Sheraton, French Lick, Inc., J. F. Collins, Jr., secretary of the Association, 827 N. Euclid Ave., Pittsburgh 6, Pa. .....**JUNE 2-6, 1958.**

OIL HEAT EXPOSITION—2nd Oil Heat and Air Conditioning Exposition at the New York Coliseum, New York. C. H. Pesterfield, secretary, Oil Heat Institute of America, Inc., 500 Fifth Ave., New York 36, N. Y. .....**JUNE 9-12, 1958.**

ASTM MEETING—Annual meeting of the American Society for Testing Materials, at the Hotel Statler, Boston, Mass. Secretary of the Society, 1916 Race St., Philadelphia 3, Pa. . .**JUNE 22-27, 1958.**

JOINT ASHAE-ASRE MEETING—Joint summer meeting, American Society of Heating and Air-Conditioning Engineers and American Society of Refrigerating Engineers. Hotel Leamington, Minneapolis, Minn. A. V. Hutchinson, secretary of the ASHAE, 62 Worth St., New York 13, N. Y., and Secretary of the ASRE, 234 Fifth Ave., New York 1, N. Y. .....**JUNE 23-25, 1958.**

EXPOSITION AND ASHAE CONVENTION—65th annual meeting, American Society of Heating and Air-Conditioning Engineers (Jan. 26-29, 1959) and 14th International Heating and Air Conditioning Exposition, Philadelphia, Pa. A. V. Hutchinson, secretary of the Society, 62 Worth St., New York 13, N. Y. . .**JANUARY 26-30, 1959.**

(Concluded from page 146)

bustion system, such as cost of water for steam, cleaning of boilers, oil and grease compounds, electricity for burner motors, pumps, lighting of boiler rooms, etc.; (7) taxes, licenses, and permits required on the respective systems.

Often, a direct value can be attributed to the space saved and the cost of fuel storage, along with the interest on the cost of the fuel in storage. When these factors are considered, we are quite likely to find the operating cost favorable to electricity.

The above has been extracted from a paper, "Electric Space Heating in Schools, Hospitals, and Industrial Applications", presented to the All Electric Heating and Air Conditioning Symposium, Columbus, Ohio, November, 1957, by H. B. Wilde, Wesix Electric Heater Co., Huntsville, Ala.

Canadian Degree-Days for December, 1957*

City	December		Cumulative	
	1957	Normal**	1957	Normal**
Calgary, Alta.	1170	1430	3509	3660
Charlottetown, P. E. I.	1026	1210	2533	2850
Crescent Valley, B. C.	1078	1220	3096	3220
Edmonton, Alta.	1405	1660	3702	4070
Fort William, Ont.	1511	1680	3763	3960
Grande Prairie, Alta.	1689	1750	4126	4300
Halifax, N. S.	868	1109	2086	2513
London, Ont.	1046	1200	2597	2680
Medicine Hat, Alta.	1095	1440	3151	3410
Moncton, N. B.	1084	1340	2714	3100
Montreal, P. Q.	1185	1390	2628	3040
North Bay, Ont.	1370	1550	3349	3620
Ottawa, Ont.	1217	1460	2795	3210
Penticton, B. C.	897	1050	2474	2590
Prince George, B. C.	1249	1440	3491	3760
Quebec City, P. Q.	1337	1530	3095	3460
Regina, Sask.	1498	1740	4001	4150
St. John, N. B.	1031	1300	2623	3130
Saskatoon, Sask.	1650	1790	4032	4250
Timmins, Ont.	1603	1740	3343	4200
Toronto, Ont.	956	1126	2265	2522
Vancouver, B. C.	705	810	2007	2120
Victoria, B. C.	665	730	1896	1970
Windsor, Ont.	963	1130	2300	2440
Winnipeg, Man.	1607	1778	3833	4030

*These data are supplied through the courtesy of the Meteorological Division Air Service Branch, Department of Transport, Canada.
The Department reports slight revisions in the figures for November as published in last month's issue. Corrected figures are: Edmonton, Alta., 1067; Victoria, B. C., 613.

WHAT READERS SAY

Installing High Pressure Ducts

EDITOR, AIR CONDITIONING, HEATING AND VENTILATING

I am interested in finding out what are the best accepted methods of joining high pressure ducts. I will appreciate any help you can give me.

P. K.

Detroit, Mich.

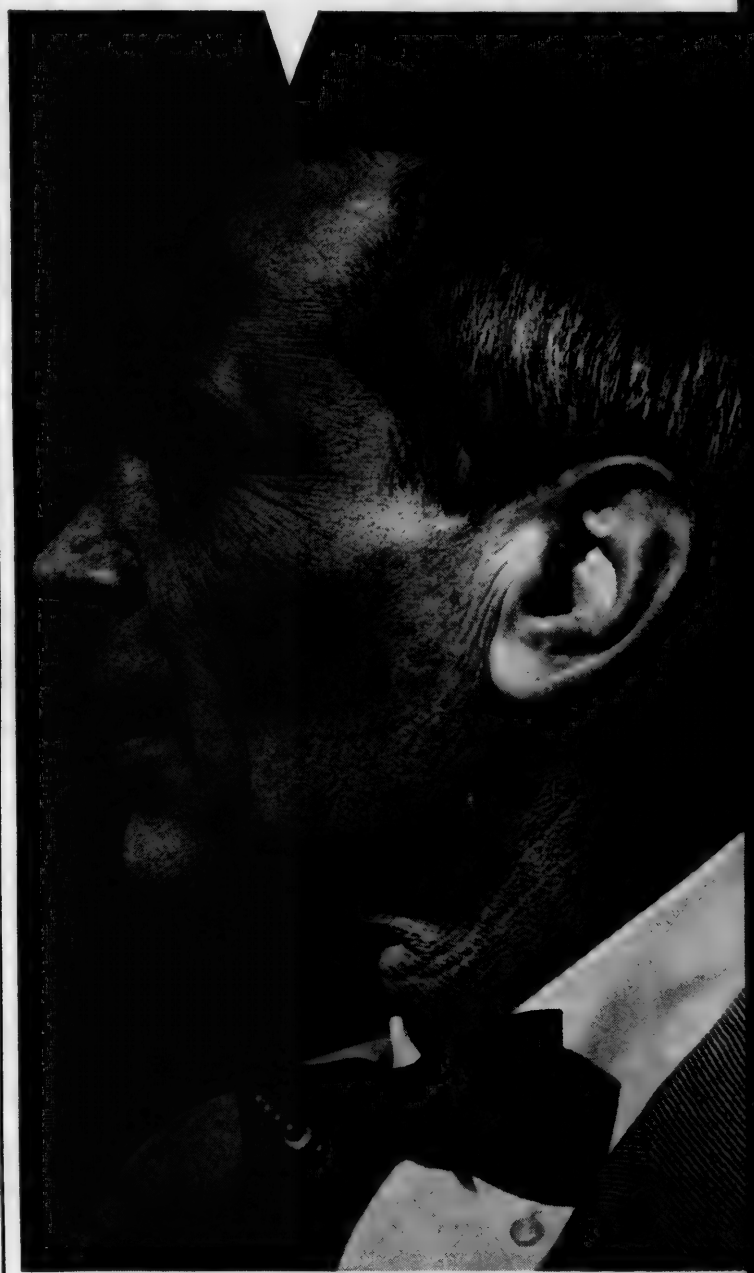
The following are in response to the reader's question, which was forwarded to several manufacturers for comment:

No exact installation procedure may be cited because each installation will differ due to building construction

(Continued on page 167)

"TI-CO's coating stays put too ...it rolls with the punch!"

says Bert Leininger



"You don't have to worry about flaking with TI-CO. Even on the lock-seamer TI-CO's zinc coating flows with the base metal . . . never fractures."

—Bert Leininger, President, Winnetka Heating & Air Conditioning Corp. Wilmette, Illinois

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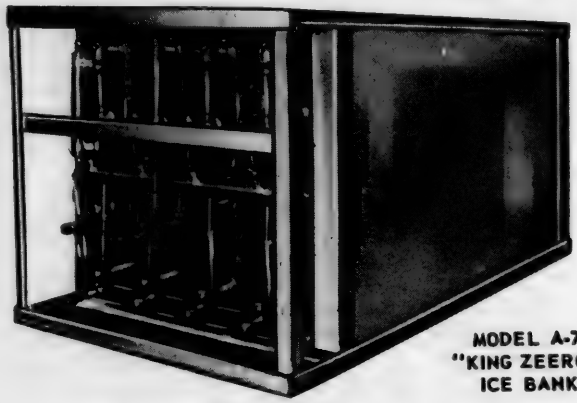
The "King Zeero" ICE BANK is designed to deliver 32° to 34°F. ice water for recirculation through air cooling coils in exactly the right amount when and where it is needed. It levels off "peak" and "valley" loads. Peak loads many times compressor capacity are easily handled. Ice Banks may be added to increase existing capacity. Refrigerant: Freon, Methyl Chloride or Ammonia.



MODEL A-7
"KING ZEERO"
ICE BANK

CAPACITIES - 500 lbs. to 30,000 lbs. (72,000 B.T.U.'s to 4,320,000 B.T.U.'s) in a single unit. Multiple units may be installed.

The Patented Coils with Built-in Louvres opposed to the flow of water through the ICE BANK provide turbulence. This eliminates a mechanical agitator - insures all the water rubbing all of the ice. No upkeep or repair expense whatever.

The "King Zeero" Ice Storage System of water chilling has definite advantages over direct expansion, or other types of ice accumulators.

Saves power through smaller compressor requirement. Simple construction (no moving parts). Dependable in performance. Low operating and costs.

Let the ice stored during light loads take care of peak loads. The compressor need only handle the average daily load - not the peak.

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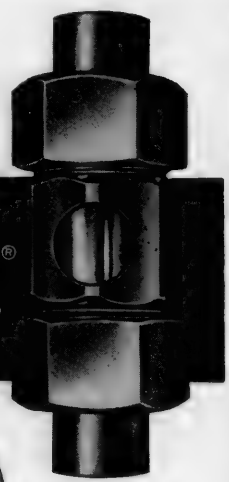
Manufacturers of Ice Builders - Ice Builder Cabinets - Ice Banks

PROVED ON THOUSANDS OF PRODUCTION LINE INSTALLATIONS!



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LIQUID EYE®
POSITIVE SEALING INDICATORS
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A built-in gasket that's always in place for positive sealing and foolproof assembly.

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The "250" has all the proved Liquid Eye advantages *plus* these newly engineered features:
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- complete, self-contained, economy unit.

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Here's brand new application information on hundreds of uses of Chromalox Electric Heating Equipment for winter weather problems. These factual reports provide you with a rich source of ideas tailored strictly to winter heating problems in and around the plant and office.

Whether it's room heating, deicing, snow melting, warming of materials, or any of a hundred winter heating jobs, this exclusive information will show you how to solve the problem the electrical way.

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Pittsburgh 8, Pa.

B-834A

Write Today!

CHROMALOX

(Continued from page 165)

features. Usually, the installation of conduit systems is divided into risers and headers (including sound attenuators). To join either:

1. Wipe the joint surface to remove dust.
2. Start the fitting into the duct. Apply a coating of Minnesota Mining and Manufacturing (3M) EC-800 or equal cement to the outside coupling surface, back to the mating bead.
3. Insert the fitting to the bead.
4. Drill 3 or more holes through the joint around the circumference and insert short #10 sheet metal screws.
5. Apply cement around the head of each screw, and allow to dry for 24 hr before testing.

Headers are hung with strap hangers. Roll hangers may also be used. One strap hanger is wrapped around the center line of the duct, then bolted to itself. For sound attenuators, the strap should be hung as a "U" for support. Recommended spacing for helical conduit, 3-10 inches dia, is 14-16 ft; for helical conduit, 12-22 inches dia, 10-12 ft; for either helical conduit or longitudinal seam pipe over 22 inches dia, 8 ft; and for sound attenuators, 4 ft.

Riser sections and their fittings are frequently assembled on the floor before hanging to expedite installation. Risers should be supported at the mid point of the entire riser only to allow free expansion and contraction, using a clamp-type hanger of band iron. A down-feed "riser" system, not more than 6 floors in height, may be supported at the bottom of the riser, if preferred. Guides are used, usually at 5-floor intervals, but at shorter distances for long runs of small diameter (3 or 4 inches). The guides may be similar to the hangers, but must be free to slide over the duct to allow for expansion and contraction.

Provision for expansion in every long run of air conduit should be provided, as stress caused by temperature change will produce leaks within the system.

Because the primary air system is operated under higher pressure than conventional systems, small leaks are critical and particular care should be taken to provide a tight system. Usually, the risers will be furred into the building. Therefore, repairing leaks discovered after completion of construction will be costly.

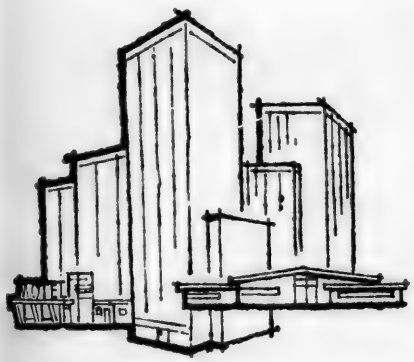
C. W. Galliker
Air Conditioning and Refrigeration Division,
Worthington Corporation,
East Orange, N. J.

* * *

Fittings are fabricated to slip inside the spiral pipe. Both ends are male ends. Fittings from 3-9 inches dia have a 2-inch extension, and fittings 10-22 inches dia have a 4-inch extension. In long runs, or whenever it becomes necessary to join two sections of pipe, a Type 14-1 coupling is used. The Type 14-1 coupling is a sleeve having a bead at its midpoint.

Two types of hangers may be used; a band around the pipe with a single suspension rod or "U"-shaped, and a metal strap which passes under the pipe and is connected to the building above the pipe at either end of the strap. Hangers should be placed about every 10 or 12 ft.

(Concluded on page 168)



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More products to give your ideas greater scope. From Honeywell you get a great variety of products both mechanical and electrical. Honeywell is the only company that makes a complete line of pneumatic, electric and electronic controls plus instrumentation for commercial buildings. With Honeywell your choice is wider, your ingenuity less restricted.

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More support. Honeywell works with you on every job, frees you from annoying details, saves you time, even helps you sell. And the assistance of Honeywell specialists in each of 112 offices throughout the country is as near as your phone.

Look over the Honeywell products and ideas on the following pages. And, remember, each is backed by the kind of support that only Honeywell can offer you.

FOR MORE TO WORK WITH ... WORK WITH HONEYWELL

(Concluded from page 167)

Four methods may be used for cutting conduits:

1. Power hand saw using a friction blade. The saw can be mounted in a fixed position and the pipe turned as it cuts.

2. An electric or air hammer equipped with a cutting tool. This method does not leave a burr that must be removed before installing fittings.

3. Table saw using either a friction blade or a metal cutting blade. This saw can be made so that the blade, in a retracted position, rests below the table and is raised into cutting position by use of a foot lever. The saw blade should extend about ¼ to ½ inch above the table and the pipe rotated in making the cut.

4. Metal cutting band saw. This method can be used on smaller sizes only.

In any of the above methods, a "V" trough-type table or a set of rollers mounted on a table makes a good method of supporting the pipe while it is being cut.

Minnesota Mining and Manufacturing EC-800 adhesive has proven to be an effective adhesive for sealing joints between pipe and fittings. If joints are properly sealed with adhesive, tape is not required. A cotton or Fiberglas tape wrapped around the joint and coated with adhesive is one method commonly used. If the joint is free of adhesive, a pressure-sensitive vinyl tape can be used. Sheet metal screws are not required to make a joint leakproof. They can be used to hold a fitting in place while the adhesive sets. Sheet metal screws at the joints add strength and stability to the entire duct system.

The system should not be tested until the adhesive has been allowed to set for at least 4 days. A joint sealed with EC-800 held 4 lb pressure when tested.

When connecting flexible hose to a fitting, since the hose is made on the English system of measurement, the takeoff on the fitting to which the hose is to be connected must be made to a different diameter than that used to fit spiral pipe. When connecting flexible hose to spiral pipe, a Type 14-1 coupling must be used to receive the hose. This connection is made in the same manner as a pipe-to-pipe connection.

We suggest the following installation pointers:

1. Apply adhesive to fitting on inside of pipe using a small brush.

2. If the adhesive becomes too thick, use methyl ethyl ketone for a thinner. This can be purchased from a concern handling wholesale drugs.

3. Slide the fitting into the pipe until the pipe hits the bead on the fitting. Smooth excess adhesive around the joint. If a pressure-sensitive tape is to be used, the excess adhesive will have to be wiped off.

4. In joining the larger sizes, if one man shakes or bounces the pipe very little difficulty will be encountered in sliding the fitting into place. This operation may become necessary because larger sizes of pipe sometimes get out of round in shipment and when kept in storage for any length of time.

5. Whenever possible, make up assemblies of pipe and fittings on the floor and then raise them into position.

M. Lautenslager
Sales Manager

United Sheet Metal Co., Inc.
Columbus, Ohio

Supervisory Data Center for the Philadelphia Transportation Center, a unique 18 story building which includes offices, stores and a bus terminal. It is another in the long list of buildings to use a Honeywell Supervisory DataCenter to centrally control its entire year 'round air conditioning. Owner and Builder: McCloskey & Company; Architect: Vincent G. Kling; Mechanical and Electrical Engineers: Robert J. Sigel, Incorporated; Structural Engineers: McCormick & Taylor Associates.

BOOK REVIEWS

Publications abstracted in this department should be ordered direct from publisher

REFRIGERATION, AIR CONDITIONING AND COLD STORAGE

The phases of development, production and application as it concerns refrigeration, are covered in a very extensive book, Refrigeration, Air Conditioning and Cold Storage, by Raymond C. Gunther, formerly Officer in Charge, refrigeration school, Army Service Forces Training Center.

The principles of refrigeration and associated subjects are explained in simple language with suitable visual aids. Calculations have been simplified.

The material is so organized that the book starts with the required physical principles, a discussion on refrigerants and then advances to the study of the mechanical refrigeration cycle. Various types of equipment and controls are described. Also covered are subjects relating to the application, operation and maintenance of the refrigeration system, including calculations for determining loads, equipment sizes, insulation, power, refrigerant flow, and pipe friction. Special chapters are devoted to brines, cold storage lubrication and air conditioning.

To facilitate the study of text material, each chapter begins with a study outline and concludes with a summary of the material in that chapter. An appendix is included which contains appropriate tables for use in following the text. References are given to outside sources of information.

Refrigeration, Air Conditioning and Cold Storage, by R. C. Gunther. Cloth bound, 6 by 9 inches, 1232 pages. Published by Chilton Company, Philadelphia, Pa. Price, $17.50.

HEAT TRANSFER

When Volume I of Heat Transfer by Dr. Max Jakob was published, the preface contained the statement that Volume II was in preparation. At the time of the author's death in 1955, this volume was essentially complete although additional work was required. Dr. S. P. Kezios, a former student and friend provided the necessary technical and editorial assistance to guide the material through the various stages of publication.

While the first volume serves as a source of basic material, the second volume deals mainly with selected fields of heat transfer applications. It includes a comprehensive discussion and analysis of heat radiation in spaces of simple configuration.

A special feature of Volume II is a section entitled Supplements to Volume I which serves to bring up to date, some of the material in the first volume which needs additions or modifications as a result of later development.

Heat Transfer, Volume II by the late M. Jakob, edited by S. P. Kezios. Cloth bound, 6 by 9 inches, 652 pages. Published by John Wiley & Sons, Inc., 440 4th Ave., New York 16, N. Y. Price $15.

*Honeywell Supervisory DataCenter**

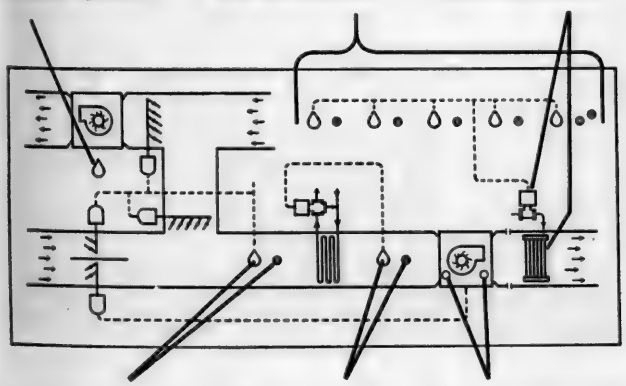
One-man control of a building's entire air conditioning system

Details from just one module of the Supervisory DataCenter in the Philadelphia Transportation Center

A. Exhaust air fan switch. Pilot light indicates operation.

B. Temp. selector knobs and check buttons for each zone.

C. Symbol for steam valve and reheater coil for each zone.



D. Temperature selector knob and check button for the mixed air temperature.

E. Temperature selector knob and check button for air leaving cooling coil.

F. Start-stop buttons for supply air fan. Pilot light in symbol indicates operation.

The DataCenter shown here is an example of the centralization of control for year 'round air conditioning systems. This panel enables one man to check and adjust the temperature at all important points. He simply pushes the check button and reads the temperature on the large indicating dial in the center of the panel. Chilled water, condenser water and cooling tower pumps, compressors, fans and valves can be operated right from the panel. System malfunctions are quickly observed and analyzed right from the panel. Repair crews can be sent to the trouble source.

A systems control center like this can give your clients more efficient operation of their air conditioning system. Honeywell can also include such other functions in your centralized panels as communications, record keeping and alarm and detection systems. A Honeywell specialist will work with you in designing a center to fit your clients' needs. *T. M.

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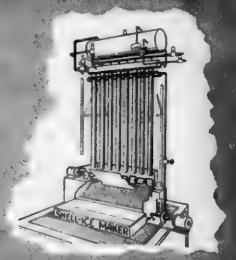
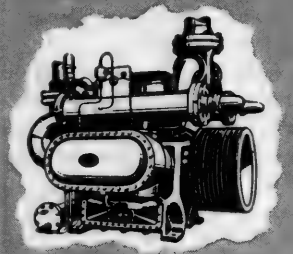
THE LEADER IN REFRIGERATION SINCE 1882

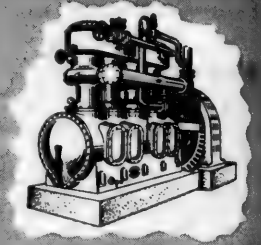
TRADE **FRICK** MARK®



- AIR CONDITIONING SYSTEMS
- CONDENSERS
- AIR COOLING UNITS
- CONTROLS, VALVES & FITTINGS
- ICE-MAKING SYSTEMS
- SHELL-&-TUBE & COIL COOLERS
- QUICK-FREEZING SYSTEMS
- LOW PRESSURE REFRIGERATION UNITS

FRICK COMPANY designs and manufacturers equipment engineered to your individual requirements.
If you need any type of commercial or industrial cooling . . . call your nearest Frick Branch Office or Distributor for recommendations and estimates.





- "ECLIPSE" COMPRESSORS
- HEAVY-DUTY COMPRESSORS

DEPENDABLE REFRIGERATION SINCE 1882

FRICK CO.

WAYNESBORO, PENNA., U. S. A.

Electronic Air Cleaner Installation in the Lake Street office of the Northwestern National Bank, Minneapolis, Minn., has in just five months brought a reduction in cleaning, decorating costs, has also reduced maintenance for such delicate working mechanisms as these proof machines.

Bank Mgr.: Leroy H. Berg; Arch. and Eng.: Magney, Tusler & Setter; Gen. Contractor: George W. Madsen Construction Co.; Vent. & Air Conditioning Contractor: O'Brien Sheet Metal Works; Elect. Contractor: Harris Brothers Plumbing Co.; Plumbing & Heating Contractor: J. McClure, Kelley and Co.

THE **weil** TVC

New *Condensate Pumps*

Features:
Low speed (1750 RPM) TVC pumps are easily installed in areas where space is important. Their compact cast iron receiver and sturdy pumping unit assure a trouble-free installation.

Dimensions:
26 gallon cast iron receiver for single or duplex units: Diameter 25"; height of return above floor 10½"; height of unit 36" max.

Installation:
Simple installation: one return connection, one discharge connection. Unit is completely assembled at the factory. Send for Bulletin TVC-300.

Send for Bulletin TVC-300

See Catalog in 1958 Sweet's and 1958 Domestic Eng. Cat. Dir.

Available from Jobbers Stocks!

TVC PUMPS now available in capacities from 750 to 15,000 sq. ft. E.D.R.

The three sizes of TVC receivers now offer a complete line of low pressure system condensate pumps to fit all requirements. The LOW RETURN CONNECTION and LOW SPEED — 1750 R.P.M., coupled with the built-in durability, operating efficiency and low cost of these pumps guarantee a satisfactory and trouble free installation. This pump provides gravity drainage for low heating units.

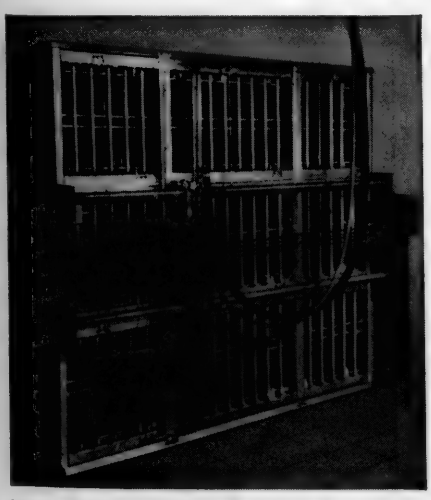
Specify and install a **weil** TVC Pump.

Built for ONE MILLION STARTS . . . without attention

1516 North Fremont Street • Chicago 22, Illinois

For your mechanical systems . . . Honeywell's Electronic Air Cleaner

eliminates dirt six times more effectively than ordinary filters.*



EASY INSTALLATION of Field Assembled models is provided by match-marking at factory, regularity of cell building blocks and detailed instructions provided with each model. Modular construction allows fabrication in almost any size.

The Honeywell Electronic Air Cleaner gives your clients reduced cleaning and decorating costs, reduced maintenance for machinery, better health and comfort for personnel. And it very often reduces heating and cooling costs because the amount of outside air taken into the building can usually be decreased.

Two types of Honeywell Electronic Air Cleaners are available to fit any air conditioning or ventilating system: Field Assembled models which are built and tested at the factory, disassembled and shipped to job site for erection in the ductwork; and Custom Package models, built with a package-enclosure, tested and shipped completely assembled for installation.

For expert information and assistance in specifying, or installing Honeywell Electronic Air Cleaners, call the Honeywell office nearest you. Or write Honeywell, Dept. HV-2-32, Minneapolis 8, Minn.

**According to tests developed at the National Bureau of Standards.*

Honeywell

First in Controls

Announcing

THE NEW BRADLEY DUO-WASHFOUNTAIN

For
- Offices
- Schools
- Institutions
- Restaurants
- Public Buildings

MAXIMUM SANITATION

New beauty of design, stronger construction, improved firm wall mounting, floor clearance, and wide hinged foot-treadle are featured in the latest model Duo-Washfountain.

Duos have gained in popularity and now the new design plus national advertising will mean much wider acceptance. Why not recommend them for your new building or modernization jobs? Get all the details . . . Write for Bulletin K-1204.

BRADLEY WASHFOUNTAIN CO.
2352 W. Michigan St., Milwaukee 1, Wis.

BRADLEY Duo Washfountains

Distributed Through Plumbing Wholesalers

Write for Bulletin K-1204

Cross section shows structural superiority of Aeromaster's new, extruded aluminum-alloy blades in diameters from 9′ to 22′.

NEW! EXTRUDED ALUMINUM Blades on AEROMASTER* fans only

AEROMASTER'S new, extruded aluminum blades combine in one design the advantages of a light weight metal, a hollow structure and the superior strength of wrought metal . . . Silicon-magnesium aluminum alloys resist corrosion. Their fine grain structure, high tensile strength and increased endurance eliminate danger from wear, vibration, and metal fatigue . . . true airfoil blade sections assure maximum air delivery . . . adjustable blade pitch angle permits decrease of fan load to an accurate minimum horsepower requirement.

The AEROMASTER fan is easily assembled *in the tower.* No special handling equipment is necessary. AEROMASTER fans cost less to install, less to operate, less to maintain!

For more details write to KOPPERS COMPANY, INC., Aeromaster Fan Dept., 6902 Scott Street, Baltimore 3, Maryland.

KOPPERS

Aeromaster Fans

Engineered Products Sold with *Service*

*Koppers Trademark

CLASSIFIED ADVERTISING

Sold at $12 per column inch.

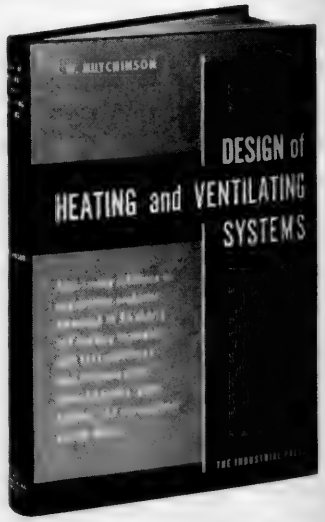
MANUFACTURER'S AGENTS

An established manufacturer with 25 years experience producing ventilating equipment is looking for manufacturers' agents in many sections of the country to sell their new line of industrial fans. The products include axial flow and tubeaxial fans, both direct and belt driven, and power roof ventilators.

Please reply Box 914, Air Conditioning, Heating & Ventilating, 93 Worth St., New York 13, N. Y.

PRINTED FORMS available for immediate shipment. Heating & oil burner materials form, burner service record cards, service order forms, inspection information form, survey sheet and others. Also can supply BURNER SERVICE form in 8 part EZE-SNAP with 3 carbons in each set, 1200 sets IMPRINTED with your name, address and telephone, only $20.40. Send for samples—no obligation. Write Dept. AC, Degree Day Systems, 39-30 58th St., Woodside 77, N. Y.

FOR SALE: Oil Burner Manufacturing business—two models—capacities 1 to 9 GPH,—home and light industrial uses. If interested write Box No. 917, Air Conditioning, Heating & Ventilating, 93 Worth St., New York 13, N. Y.



SOLVE COMPLEX CALCULATIONS EASILY . . . FAST!

DESIGN OF HEATING AND VENTILATING SYSTEMS contains 96 working graphs from which you can solve problems involving load determination, duct design, panel heating, solar heating and combustion analysis *directly.*

$7.00

In Canada or overseas, $7.80

320 Pages 96 Charts & Illustrations

THE INDUSTRIAL PRESS
93 Worth Street, New York 13, N.Y.

FOR LOW COST HEATING PLANT POWER-DRAFT AND INDUSTRIAL EXHAUSTING

...Specify

Quickdraft

★ NO MOTORS, FANS OR BEARINGS IN EXHAUST LINE ★ NEEDS NO STACKS ★ ACID RESISTING FINISHES ★ STATIC PRESSURE UP TO 12 INCHES

FOR HEATING PLANTS AND INCINERATORS, Quickdraft provides constant draft for efficient and economical combustion. It eliminates pulsating or chattering, puffing, smoking and sooting. Costly, tall and unsightly stacks are unnecessary.

FOR INDUSTRY, Quickdraft offers up to 12 inches static pressure for exhausting corrosive gases, abrasives and paint spray . . . moving fine bulk materials and wastes.

FOR MOVING AIR . . . in or out of building through ducts . . . Quickdraft is outstanding.

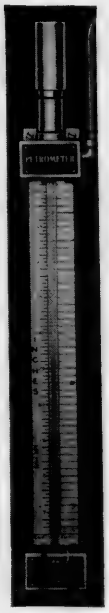
N-588-QD

IMPORTANT NOTICE

For withstanding corrosive gases, all Quickdraft units are available in standard acid resisting vitreous enamel, No. 316 Stainless Steel, rigid plastics (P.V.C.) and with plastic and Fiberglas coatings.

Write for QUICKDRAFT ENGINEERING DATA on your application . . . today.

Quickdraft CORPORATION P. O. Box 87--O Canton 1, Ohio



4 steps

to Better Measurement of Tank Contents

The PETROMETER

Tank Gauge offers you the convenience of Remote Reading plus these four extra features:

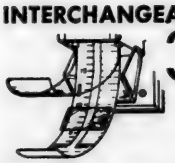
SIMPLE, TROUBLE-FREE DESIGN • • • No complicated and troublesome pulleys, springs, or other mechanical or electrical gadgets—the Petrometer gauge operates on the principle of static pressure—a principle that is as unfailing as the law of gravity. Its operation is similar to that of the familiar U-tube. Simple, rugged and dependable.

1

CONSTANT ACCURACY • • • The large vertical scale on the Petrometer gives you constant, accurate readings. The red liquid column is clearly visible—moves up and down as contents vary, just like the liquid level in your tank.

2

INTERCHANGEABLE SCALES • • • The scale on the Petrometer is readily removed or adjusted to correct for tank pitch or when changing liquids. No tools are needed.



3

EASY INSTALLATION • • • Gauges can be installed on tanks above or below the ground and up to ¼ mile away. The tank assembly for the gauge can be installed even when the tank contains liquid. It can also be fitted in the tank separately to complete the tank work and the gauge connected any time later. Just tighten one simple connection and installation is complete.

4

Send for Bulletin PH today.

7

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43-22 TENTH ST., LONG ISLAND CITY 1, N. Y.

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HEATING SPECIALTIES ..... adhere to top-level standards of protection and control in many prominent buildings. Complete catalog offered covers steam, water, air pressure regulators, relief valves, boiler water level controls, and hot water heating specialties.
Inside Front Cover — Item 200

44-PAGE STEAM TRAP BOOK ..... covers traps' excellent air handling characteristics. Also selection, installation, and maintenance.
Page 1 — Item 201

CABINET HEATERS..... in a new deluxe series are especially designed for modern hydronic heating for buildings of almost every type. Twenty-one hot water ratings, 14 steam ratings, and a full range of cabinet styles are offered. Two bulletins are available.
Page 2 — Item 202

HEATING PUMPS..... meet unusual and exacting conditions, offering custom design at a standard price. Pumps are inexpensive to install, operate and maintain. Bulletin is available.
Page 5 — Item 203

ALUMINUM INSULATION BOOKLET... is available, which describes some very interesting heat flow tests in roofs and walls with aluminum insulations conducted at MIT and Pennsylvania Engineering Experiment Station. Samples of insulation also available.
Page 7 — Item 204

THIRSTY HORSE POWER..... needs water; so does the horsepower in your hot water space heating boilers and steam heating boilers. The only real answer to a thirsty boiler is to install a dependable device that automatically adds water to maintain a safe level in the boiler. Catalog is available.
Page 9 — Item 205

MULTI-ZONE AIR CONDITIONERS.... will heat and cool simultaneously as outside weather conditions or inside requirements make necessary. Patented high heat transfer coils. Information available.
Page 11 — Item 206

COIL SECTIONS..... completely drainable and easily cleaned are specially designed for installations where frequent mechanical cleaning of the inside of the tubes is required. They feature high heat transfer rate. Bulletin is available.
Page 13 — Item 207

PACKAGED LIQUID COOLER..... is the only unit of this kind with all major components designed, built, and guaranteed by one manufacturer, including the motor. Complete file of specifications and application data available.
Page 15 — Item 208

OIL-FIRED BOILER LINE..... is offered with net capacities, I-B-R rated to 2,712,000 Btu. Catalog on gas, oil, and all-fuel boilers for commercial and industrial installations offered.
Page 16 — Item 209

IF YOU SPECIFY..... air moving equipment, fan manufacturers' association bulletin explains certified ratings system for you.
Insert Pg. 16A — Item 210

Circle numbers corresponding to the items and advertisements in which you are interested, print your name and address clearly. Information will be sent directly from manufacturers.

Below and on the following pages are given brief digests of the advertisements appearing in this month's issue. Use this Digest to locate and refer to the advertisements in which you are particularly interested, then fill out and mail the prepaid postcard to request further information from manufacturers.

The items appear in the same order as the advertisements to which they refer, to facilitate obtaining further information after reading an advertisement. NOTE: All advertisements are digested here except those received too late for inclusion. The Index of Advertisers lists all the advertisements in this issue.

Use the postcard below for catalogs, new equipment and materials, as well as Ad-Digest items.

UNDERGROUND PIPING SYSTEMS.... have served Annapolis since 1931 and are now serving the new Air Force Academy. Exceptionally high thermal efficiency. Information available.
Insert Pg. 16B — Item 211

LOCK-SEAMING OPERATIONS..... can give trouble; if they do, the company recommends switching to its zinc-coated steel as other fabricators are doing. Booklet is available.
Page 17 — Item 212

COLOR-CODED COPPER TUBE..... has made a big hit with president of Geiler Plumbing and Heating Company, Cincinnati, Ohio, who finds it a big time and money-saver in handling and installing water tubes. Information available.
Pages 18-19 — Item 213

50,000 EXHAUSTERS..... of the axial roof and centrifugal wall type with U-spring cushion suspension mounting have been installed in the last 2 years. Not one failure. Information available.
Page 20 — Item 214

STAINLESS STEEL CATALOG..... contains complete information on properties, application, standards, welding procedure, and all types of company's stainless steel fittings and flanges.
Insert bet. Pgs. 20-21 — Item 215

WATER-SAVING CONDITIONERS..... from 2-250 tons capacity and larger are offered. Two of them air cooled, one evaporative cooled. Complete information on these advanced new products and their application to your jobs are offered by the company.
Pages 22-23 — Item 216

SPACE-SAVING CONDITIONING..... provided by fan-coil units with outside air intakes. Interior zones can be installed in out-of-the-way spaces. Units for any kind of building, any type of system. Matched equipment works together. Information available.
Pages 24-25 — Item 217

COMFORT INSURANCE..... for the America Fore Insurance Group Building is the result of a system combining one manufacturing source's automatic controls and air distribution products. Comfort standards chart and bulletin are available.
Pages 26-27 — Item 218

FILTERS GUARANTEE BETTER AIR in new home office building of Connecticut General Life Insurance Company in Bloomfield, Conn., one of the outstanding architectural designs of the decade. Company's filters provide 650,000 cfm of better air: 28½ sq ft of filtering in 2 ft by 2 ft by 8 inch unit. Bulletin available.
Pages 28-29 — Item 219

INQUIRY CARD

Circle below item numbers on which you wish catalogs or further information

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310

PLEASE PRINT — Feb. H-58

This service available only to U.S. and Canadian readers.

Name .....

Title or Job Function .....

Firm .....

Nature of Firm's Business .....

Street .....

City .....Zone ....State .....

This card is void after May 1, 1958

FIRE PROTECTION EQUIPMENT.....
is best for specifying because of wide selection, standard specs and well known name; and best for installing because there are no delays, lower cost and reliable, on-the-job help. Catalog available.
Pages 30-31 Item 220

ROOF VENTILATORS.....
have simplified design which reduces obstruction to air flow for higher efficiency, lowered initial cost, and guaranteed minimum maintenance. Bulletin contains all specifications.
Page 32 Item 221

CORROSION-RESISTING DRAIN.....
has high silicon iron throughout the thickness of the pipe wall. Will outlast the building itself. Information available.
Page 33 Item 222

NEW COMPLETE FURNACE LINE....
presents opportunities for a future in both heating and air conditioning. Vertical and horizontal models. Information available.
Page 34 Item 223

FUEL OIL PRE-HEATER.....
uses secondary steam to pre-heat heavy fuel oil in a high temperature hot water system. Additional data are available.
Page 35 Item 224

VALVE PERFORMANCE FACTS.....
is tip-filled book containing 32 case histories throughout industry by leading valve manufacturer since 1855.
Page 36 Item 225

TRIPLE-FUEL DRAFT CONTROL.....
is designed for oil, oil-gas, gas, and coal-fired furnaces and boilers with 10-32-inch outlets, either natural, induced, or forced draft. Ad is removable data sheet. Further information available.
Insert Pages 37-38 Item 226

CONDENSATION PUMPS.....
of the centrifugal type are offered in three models, and feature cast iron receivers, bronze-fitted pump with stainless steel shaft, and packed-type stuffing box. Information is available.
Page 39 Item 227

CENTRIFUGAL FANS.....
have backward-curve air foil blades that move more air with less noise. No shock loss results in higher efficiency. Up to 9 inches static pressure. AMCA rated. Catalog available.
Page 41 Item 228

PNEUMATIC CONTROL SYSTEM.....
benefits Chicago taxpayers as this company's quality system was installed in elementary school to control forced hot water heating in concealed fin radiation. First Chicago school installation—1901. Information available.
Pages 42-43 Item 229

AIR DIFFUSER KNOW-HOW.....
is a specialty of this manufacturer with more years of air diffuser experience than any other. Line includes high velocity units, punkah louvers, air diffusers, filters, and exhausters. Information available.
Page 44 Item 230

HEAVY-DUTY BRONZE VALVE LINE
is produced to the same high quality standards that have made the company one of the leading manufacturers of domestic plumbing and heating valves. Condensed catalog and comparable valve chart offered.
Page 45 Item 231

WARM AIR SPACE HEATING.....
is accomplished by the manufacturer's heater which gives the kind of performance possible only in a heater in which every part has been designed and built to function as an integrated unit. Bulletin is available.
Pages 46-47 Item 232

MOTOR-DRIVE REQUIREMENTS.....
are met by skilled specialists who know motors and the needs of appliance and equipment manufacturers. Their on-the-spot service is important when tomorrow can be too late. Information is available.
Page 48 Item 233

HIGH VELOCITY FOR SCHOOLS.....
is thoroughly discussed in new school catalog which contains performance and dimension data, control diagrams and everything you need to specify all-air HV heating and ventilating.
Page 49 Item 234

MOTOR CONTROLS.....
made by this company are factory installed on all Heat-X packaged water chillers assuring years of trouble-free performance. Handy catalog available.
Page 50 Item 235

BOILER SERVICE.....
from this manufacturer consists of aid and supervision in start-up, boiler operating instruction to attendants, and competent and dependable servicing, when required. Information on company's boilers and service program is available.
Page 51 Item 236

TEMPERATURE REGULATORS.....
with packless construction have advantages which include the elimination of repacking problems, lower maintenance, and accuracy of regulation. This company's units are guaranteed not to wire-draw. A bulletin with piping layouts is available.
Page 52 Item 237

CONDENSING UNITS.....
for any kind of air conditioning and refrigeration installation are provided with a complete customer satisfaction guarantee. Units 20 years old are still in operation. Complete data available.
Page 53 Item 238

150 AIR HANDLING UNITS.....
are installed in world's newest and largest surgical dressing plant, Johnson & Johnson's, New Brunswick, N. J., installation. Includes heaters, central system air conditioners, ventilating fans. Information available.
Page 54 Item 239

INDUSTRIAL HEATERS.....
for space heating, drying, make-up air, oven applications, 400,000-2 million Btuh, feature 4-pass design, master control, stainless steel combustion chamber, double casing, metal radiation shield. Complete data offered.
Page 55 Item 240

AMCA-RATED AIR MOVERS.....
are built by charter member of AMCA and produced to AMCA standards. Backward curve blower and centrifugal roof ventilator are two in its expanded line. Bulletins available.
Page 56 Item 241

COPPER SIMPLIFIES PLUMBING.....
in new South Bend hospital where 7000 ft of copper drainage tube in sizes from 1¼-6 inches was used in sanitary drainage system and 25,000 ft Type L copper tube in sizes from ¼-4 inches for hot and cold water supply lines. Bulletin available.
Page 57 Item 242

THE RIGHT AIR VENT.....
in the right spot has, over the years, worked miracles in clearing up malfunctioning systems, eliminating spotty and erratic conditions that expensive alterations in vacuum or steam layout had not cured. Catalog is available.
Page 58 Item 243

SNAP-ON PIPE INSULATION.....
provides initial saving of $10,140 on 13,000 ft of pipe insulating material and annual operating saving of $1,836 in new industrial plant. Analysis of your insulating problems offered.
Page 59 Item 244

STEEL PIPE.....
is providing dependability and long life for Lamson & Sessions Co., Cleveland, Ohio, producers of industrial fasteners. Information is available.
Page 60 Item 245

FIVE PACKAGED BOILERS.....
are installed in 3 Cadillac agencies: two 70-hp hot water boilers, two 100-hp low pressure steam boilers and one 200-hp low pressure steam boiler. Result in each case is fuel economy and dependability. Bulletin available.
Page 61 Item 246

VALVES IN HOSPITAL.....
were selected after passing a tough "physical." Used for all standard applications in 21-story building. They cost no more. Information available.
Page 62 Item 247

ROOM-BY-ROOM CONTROL.....
of temperature is accurate, economical and practical with units that feed from steam supply. Has air filter, steam driven fan and non-electric thermostat. Recesses. Specifications available.
Page 63 Item 248

ELECTRIC HUMIDIFIERS.....
are designed to provide capacity for practically any size requirements, automatically introducing water vapor, removing up to 70% of all bacteria in the air stream. Information is available.
Page 64 Item 249

DISCIPLINED COPPER.....
goes through company's own smelter, electrolytic refining tanks, piercing mills, and extrusion presses, then coiled, annealed, straightened and tested. Product is perfect seamless tube, pipe and fittings. Information available.
Page 65 Item 250

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AIR CONDITIONING, HEATING AND VENTILATING
93 WORTH STREET
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AD-DIGEST SERVICE

AIR-CONDITIONING-DUCT NOISES.... are muted with black-vinyl-coated new duct liner which has high acoustical and thermal efficiency plus money saving advantages of pigmented coating. Information available.
Page 96 Item 251

REFRIGERANT VALVE BULLETIN.... illustrates 12 points of quality. Three major parts are interchangeable to provide wide capacity and operation ranges. Bulletin available.
Page 67 Item 252

FIBER GLASS INSULATION..... is used by National—U. S. Radiator Corporation to insulate boilers for home and commercial use and found easier to handle, cleaner, easy to cut and cheaper to ship. Information available.
Page 66 Item 253

COPPER TUBE IS ALWAYS THERE.... at your call, because company has depots strategically located from coast to coast ready to fill orders without delay. Red brass pipe, too. Information is available.
Page 69 Item 254

FIVE STEEL BOILERS..... heat Albany, N. Y. shopping center: One standard Scotch type, one compact type welded steel, and three packaged Scotch type. All SBI rated. Full ratings and data available.
Page 121 Item 255

FORCED DRAFT BURNERS..... for smaller boilers (oil, gas, or combination gas-oil) eliminates the need for a high stack yet requires no induced fan. For any type boiler from 18-93 bhp. Catalog available.
Page 123 Item 256

STORAGE HEATER AND TANKS..... are designed to meet the hot water needs of huge District of Columbia Hospital Center. They supply thousands of gallons of hospital-pure hot water. Information is available.
Page 125 Item 257

CUSTOM EXPANSION JOINTS..... designed and developed to customers' specialized requirements. Corrugated, flexible joints absorb movement in three dimensions, at high temperatures and pressures. Information available.
Page 127 Item 258

AXIAL FANS DELIVER..... the volume you need, and fit the space you have: 73 company branch offices from coast to coast are staffed by skilled sales engineers. Information available.
Page 129 Item 259

BIG-BUILDING AIR CONDITIONING... provided by complete line of central plant and multizone conditioners, sprayed coil units, heating and ventilating units, heating and cooling coils, and air-cooled condensers. Catalog available.
Page 131 Item 260

DRY CONDENSING CATALOG..... includes standard air-cooled condensing systems up to 540 tons and units for heat pump applications with no horsepower limit.
Page 133 Item 261

ELECTRONIC AIR CLEANER..... can now be installed in-line wherever air distributing units are used. Less than 26 inches wide. Information offered.
Page 135 Item 262

ALL-BRONZE BOOSTERS..... circulating hot or cold raw service water for faucet or industrial uses, will withstand the corrosive effects of continuously pumping fresh water which ordinarily materially shortens pump life. Bulletin available.
Page 137 Item 263

BRONZE VALVE CATALOG..... illustrates and gives complete specifications of company's low pressure, pressure rated, and special type bronze valves including new Y-pattern globe and check valves.
Page 139 Item 264

BIG AIR CONDITIONING JOBS..... require a big line of compressors to meet various size requirements. Long life and reliable operation are features of the manufacturer's big line of compressors. Information is available.
Page 141 Item 265

CENTRAL STATION UNITS..... air condition large projects more efficiently and at less cost due to company's method of factory assembly. Data are available.
Page 143 Item 266

REFRIGERANT CONTROLS..... no matter what the size, guarantee peak performance in any air conditioning installation. Filter-driers, solenoid valves, expansion valves, distributors, etc. Information available.
Page 145 Item 267

ROOF VENTILATORS..... made by this company include a low contour model, a large volume model for high velocities, wind driven turbine types and exhaust fans for corrosive fumes. Catalog with specifications and performance data is available.
Page 147 Item 268

FAIL-SAFE MIXING VALVE..... for water has replaceable cartridge which houses all working parts. Never needs to be removed from line for costly servicing. Corrosion free. Information is available.
Page 147 Item 269

INDUSTRIAL VENTILATION..... problems are solved in efficient manner by complete line, certified performance, and competitive pricing of manufacturer's air moving equipment. Catalog is available.
Page 148 Item 270

COMPLETELY DEPENDABLE MOTORS range from 1/6 to 600 hp, singlephase or polyphase, in a wide variety of enclosure types and mountings. Information available.
Page 149 Item 271

BOILER COST ANALYSIS..... proves in most cases that a self-contained boiler costs less. Completely packaged installation, pre-testing, starting service, and on-the-job operator training decreases over-all costs. Details are available.
Page 150 Item 272

REGISTERS AND GRILLS..... are tested and approved by Anemostat's laboratories to insure maximum efficiency of equipment; 56-year-old firm offers catalog containing complete data.
Page 151 Item 273

HIGH-CAPACITY COOLING TOWER... comes in small package. Ideal for air conditioning installation in 5-60 ton range. This unit has 7 ft 6 inch by 13 ft base, 5 ft height. Bulletins available.
Page 152 Item 274

REGISTER-GRILLE CATALOG..... is available showing manufacturer's complete line including baseboard diffusers, baseboard register, perimeter floor registers, and ceiling air diffusers.
Page 153 Item 275

THREE UNIT HEATERS..... for modern business and industry: Suspended type is gas fired with choice of propeller fan or centrifugal blower; free standing, direct fired heaters for gas, oil or both; and duct type designed for assembly in custom engineered duct systems. Data are available.
Page 154 Item 276

HUMIDITY CONTROL..... provides more effective air conditioning because cooling and heating functions are made separate from adding or taking away of moisture. Two bulletins which describe system are available.
Page 155 Item 277

HOT PIPE INSULATING SYSTEMS.... are adaptable where extreme strength, load bearing, water protection for bad ground and water conditions, uncertain soil and undependable fill ground conditions exist. Bulletins available.
Page 155 Item 278

COMPLETE VENTILATOR LINE..... includes a type and size to put air to work most efficiently and economically for your specialized needs. Ventilator data book is available.
Page 156 Item 279

25 INSTALLATIONS..... of this company's air conditioning apparatus have gone into booming Phoenix, Arizona. Company's teams are ready to assist in your engineering problems, too.
Page 157 Item 280

Circle numbers corresponding to the items and advertisements in which you are interested, print your name and address clearly. Information will be sent directly from manufacturers.

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Circle below item numbers on which you wish catalogs or further information

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Ad-Digest

SOLENOID VALVES
are quiet and dependable for control of air conditioning as in fabulous Americana Hotel, Miami Beach, with 475 guest rooms, each with individually controlled heating, cooling unit. Information available.
Page 157 Item 281

HUMIDIFYING SPRAY NOZZLES
and related accessories for humidifying are available from a single dependable source. For industrial installations everything but piping, wiring, and compressor is provided. Bulletin is available.
Page 157 Item 282

FLEXIBLE EXHAUST HOSE
is made of strong Neoprene-coated cotton or nylon fabrics spiral-wire reinforced. Hose is installed for dust control, particularly at elbows and moving hoods. Information is available.
Page 158 Item 283

DIFFERENTIAL PRESSURE CONTROL
is extremely sensitive and has hermetically sealed magnetic mercury switch to make or break electrical circuits on small changes in the difference between two pressures. Bulletin is available.
Page 158 Item 284

MOTORIZED VALVE
thermostatically controlled for zoned heating replaces conventional radiator valves without plumbing changes in steam and hot water systems. Information is available.
Page 159 Item 285

ROOF VENTILATORS
in aluminum housings, the same as specified for U. S. Air Force Academy, feature low silhouettes. Factory fabricated roof curb offered for sound control. Information on both available.
Page 159 Item 286

RADIANT-ACOUSTICAL CEILINGS
provide complete integration for economy, comfort, and efficiency. Never caused condensation! Folder describes them.
Page 160 Item 287

SPIRAL PIPE AND FITTINGS
and sound absorbers are custom made to cut costs and quicken accurate estimates for high velocity air movement systems. Catalog shows detailed specifications and applications.
Page 160 Item 288

VENTILATORS AND EXHAUSTERS
present uniform appearance, are of all-aluminum construction and are offered in belt and direct-drive models. AMCA rated. Catalog available.
Page 161 Item 289

FLOAT CATALOG
solves liquid level control problems involving floats. Catalog provides complete technical data on types, sizes and suitable metals. Floats are made in a variety of metals in sizes from 2½ to 14 inches.
Page 161 Item 290

CENTRIFUGAL ROOF EXHAUSTERS
enhance the beauty of building skylines. Forward or backward curve wheel within or out of scroll housing. Bulletin available.
Page 162 Item 291

AIRBORNE NOISE SILENCERS
have been designed specifically to reduce the airborne noise generated by fans in industrial air conditioning and ventilating systems. They are compact, light weight and acoustically efficient. Literature is available.
Page 162 Item 292

PLASTIC LEAD SEAL SAMPLES
are offered to prove that compound gives 100% seal on original connection up to 550 degrees, 6000 psi for water, steam, oil, gas, refrigerants, and chemical and petroleum products.
Page 163 Item 293

NEW AIR METER
is an all-purpose, low cost instrument for static pressure and air velocity measurement. Entire kit fits in shirt pocket, as described in bulletin available.
Page 163 Item 294

FIN TYPE COILS
are made by this company for air conditioning, refrigeration, and heating in copper or steel hot galvanized. Pipe coils are also made in complicated assemblies or production runs from any type of pipe or tubing. Details are available.
Page 163 Item 295

BEST IRON AVAILABLE
hammers flat and stays flat, is hard enough to take rough treatment but soft enough to hammer down quickly and stay down, testifies shop foreman. Information available.
Page 164 Item 296

GALVANIZED COATING STAYS PUT
and flows with the base metal, never fracturing, testifies heating and air conditioning director. Information available.
Page 165 Item 297

POSITIVE SEALING INDICATORS
proven on thousands of production line installations have one piece extended gasket for positive sealing and fool-proof assembly. Complete line catalog available.
Page 166 Item 298

ICE BANKS
are designed by this manufacturer to deliver tons of 32 to 34-deg F ice water for recirculation through air cooling coils in air conditioning systems. Designed for use with Freon, methyl chloride, or ammonia, the banks may be added to existing systems for increased capacity. Information is available.
Page 166 Item 299

ELECTRIC HEATING
application data for winter weather problems are given in a book offered by this manufacturer. Factual reports give solutions to problems on room heating, snow melting, de-icing, or warming materials.
Page 166 Item 300

SUPERVISORY CENTERS
provide one-man control of a building's entire air conditioning system. Company's specialist will work with you in designing a center to fit your clients' needs. Information available.
Page 169 Item 301

REFRIGERATION EQUIPMENT
to meet any type of commercial or industrial cooling is engineered to your individual requirements. Information is available.
Page 170 Item 302

ELECTRONIC AIR CLEANERS
reduce cleaning and decorating costs, machinery maintenance, and also heating and cooling costs because the amount of outside air taken into a building can usually be decreased. Information is available.
Page 171 Item 303

CAST IRON RECEIVERS
in three sizes now offer a complete line of low pressure system condensate pumps to fit all requirements. Features include low return connection, low speed and long line. Bulletin is available.
Page 171 Item 304

DUO-WASHFOUNTAIN
for offices, schools, institutions, restaurants, and public buildings offers beauty of design, strength of construction and improved wall-mounted floor clearance and wide hinged foot treadle. All details contained in bulletin.
Page 172 Item 305

FANS WITH ALUMINUM BLADES
combine in one design the advantages of a light weight metal, a hollow structure, and the superior strength of wrought metal. Easily assembled in the tower, fan requires no special handling equipment. Details are available.
Page 172 Item 306

TANK GAGE
in addition to convenience of remote reading offers four extra features including simple design, constant accuracy, interchangeable scales, and easy installation. Bulletin is available.
Page 173 Item 307

DRAFT INDUCER LINE
for low cost heating plant power draft, and industrial exhausting. Up to 12 inches pressure for exhausting corrosive gases, abrasives, and paint spray. Engineering data bulletin offered.
Page 173 Item 308

POWER ROOF VENTILATOR
of centrifugal type has many special features illustrated with weather enclosure removed: High efficiencies, static pressures, range of sizes to name a few. Only 4 bolts to install. Bulletin available.
Inside Back Cover Item 309

THREE-WAY MIXING VALVES
for liquids offer substantial economies in both installation and maintenance, plus design features that assure consistent, high-accuracy control performance. Two bulletins are available.
Back Cover Item 310

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93 WORTH STREET
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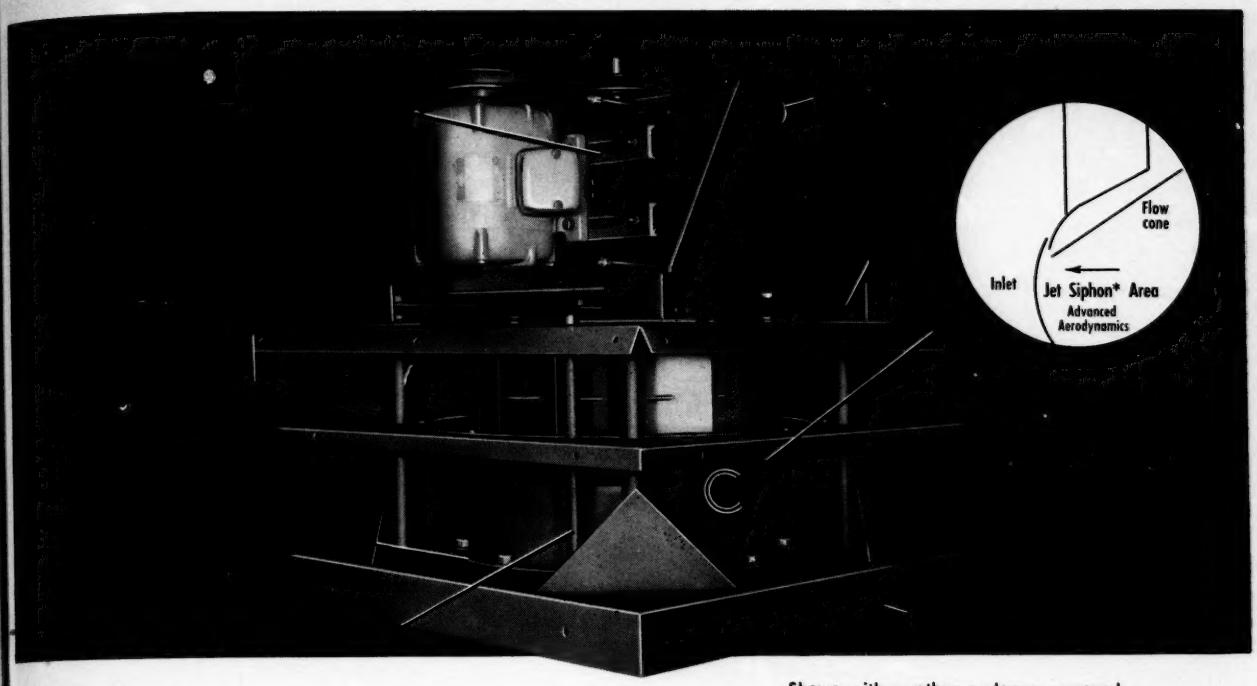

Shown with weather enclosure removed

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POWER ROOF VENTILATOR — CENTRIFUGAL TYPE

Jet Siphon* feature for stable, high efficiency.

Static pressures to 2" — thus well suited to both light-duty installations without ductwork and applications where ductwork or hoods impose considerable resistance.

Adaptable to a wide range of motor sizes.

Variable pitch V-belt drive.

Wheel and inlet designed for streamlined air flow.

Built heavy-duty throughout to assure long-lasting, trouble-free service.

Every wheel statically and dynamically balanced on precision machines.

Inspection panel and complete accessibility.

Low overall height.

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Engineered and constructed for extra quietness.

Heavy-duty anti-friction bearings.

Simple installation — only 4 bolts required.

Write today for Bulletin 550. Clarage Fan Co., Kalamazoo, Mich.

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*Patent applied for

...dependable equipment for making air your servant

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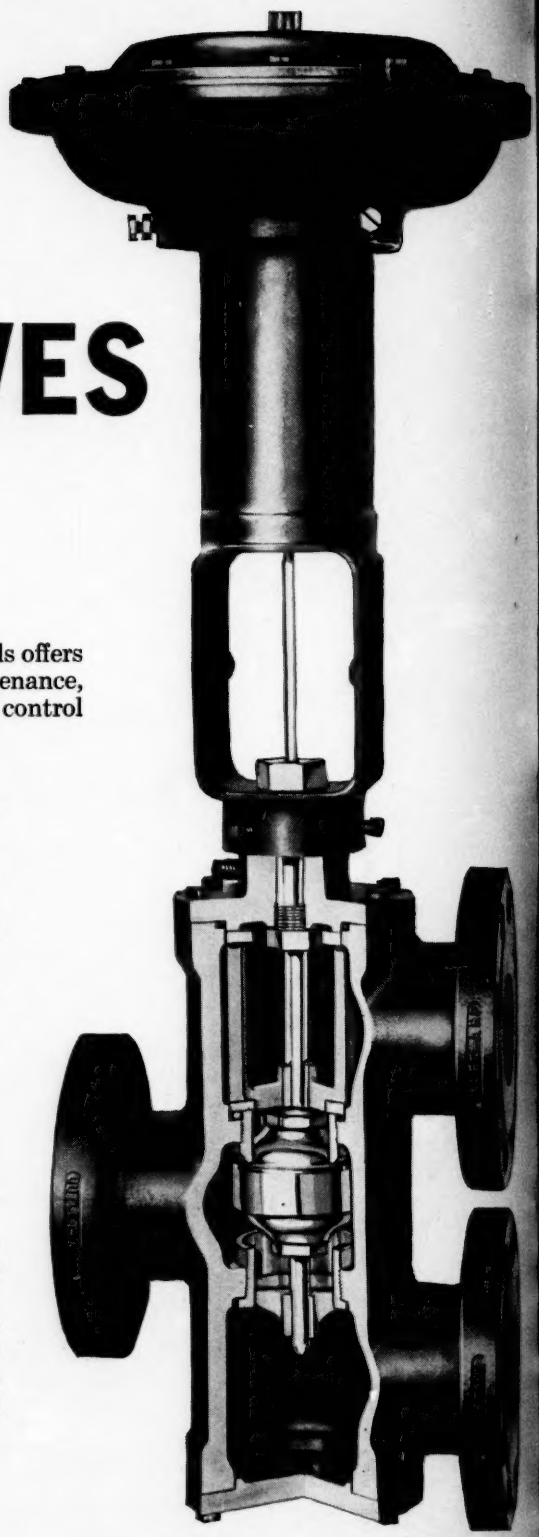
NEW

JOHNSON THREE-WAY MIXING VALVES



Beat High Installation and Upkeep Costs

The new Johnson line of Three-Way Mixing Valves for liquids offers you substantial economies in both installation and maintenance, plus design features that assure consistent, high-accuracy control performance. Here's how:

- **Piping hookup simplified**—*straightaway piping connections eliminate elbows, allow faster, easier, less costly installation.*
- **"In the line" servicing**—*discs and seat rings can be replaced without removing the valve from the line. A big time saving feature that cuts upkeep cost and eliminates unnecessary downtime.*
- **High lift**—*for precise proportioning over wider range.*
- **No leakage**—*positive seating.*
- **Modulating plugs**—*assure uniform flow, greater accuracy.*
- **Constant total capacity**—*regardless of inner valve position.*
- **No slamming or water hammer**—*valve seats against the flow.*

The valves are furnished for either proportional or two-position control in sizes from 2½" to 6" and in 125 and 250 lb. standard construction.

Mail the coupon today for complete details on these efficient new valves. Or, better still, talk to a nearby Johnson engineer. The specialist Johnson organization offers the most complete line of pneumatic equipment for solving all temperature, humidity and pressure control problems.

JOHNSON SERVICE COMPANY
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Please send me Bulletin Nos. V-214 and V-215 describing your new Three-Way Mixing Valves.

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